TITLE PAGE

ASSESSMENT OF THE EQUIVALENCE OF WAEC AND NECO MATHEMATICS MULTIPLE-CHOICE TESTS USING ITEM RESPONSE THEORY

BY

OGUOMA, CHINYERE CHINWEIKE

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CERTIFICATION

This is to certify that Oguoma Chinyere Chinweike with Registration Number 2010177002F is responsible for the work submitted in this dissertation, that the work is original except as specified in the acknowledgements and references.

Oguoma, Chinyere Chinweike

APPROVAL PAGE

This Dissertation has been approved for the Department of Educational foundations, Faculty of Education Nnamdi Azikiwe University, Awka.

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Prof. Romy Okoye Date

Supervisor

------------------------ --------------------------

Prof. N.N. Agu Date

Head of Department

------------------------ --------------------------

Prof. O.S. Abonyi Date

External Examiner

------------------------ --------------------------

Prof. O. Ibeneme Date

Dean, Faculty of Education

------------------------ --------------------------

Prof. H. I. Odumegwu Date

Dean, School of Post Graduate Studies

DEDICATION

This research work is dedicated to my husband Hon. Chinweike Oguoma.

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TABLE OF CONTENTS

LIST OF TABLES **PAGES**

LIST OF CHARTS

PAGES

ABSTRACT

The study assessed the equivalence of West African Examination Council and the National Examination Council mathematics multiple-choice tests, from 2011 to 2014 using item response theory (IRT). The study was necessitated by the recurring variation in performance levels of candidates in the examinations conducted by the two examining bodies. Six (6) research questions and two (2) hypotheses guided the study with descriptive survey as the research design. The study was carried out in Imo-State. A sample of 1051 students in SS 3 was chosen through a combination of non-proportionate random sampling and cluster sampling techniques for the study. The research instruments were the mathematics multiple-choice tests administered by WAEC and NECO in 2011, 2012, 2013 and 2014. The pair of NECO 2011 and WAEC 2011 tests were separately administered within one week simultaneously in the 30 selected schools. The NECO 2012 and WAEC 2012, NECO 2013 and WAEC 2013 and NECO 2014 and WAEC 2014 tests were similarly administered at two weeks interval between each pair. The method of data analysis for the study involved the use of factor analysis model of SPSS version 21 for research question 1, tetrachoric correlation module of LISREL version 8.8 and frequency count for research questions 2 and 3, calibration module of BILOG MG version 3.0 for research question 4, empirical reliability of the calibration model, of BILOG MG version 3.0 for research question 5 and linear equating transformation equations and scatter plots for research question 6. The Z-test of correlation analysis was used to test the null hypotheses. The major findings of the study were that (v) NECO and WAEC mathematics tests of 2011, 2012, 2013, and 2014 did not fulfill all the conditions that are required for test scores obtained from two tests designed to measure the same ability of examinees to be used interchangeably, therefore they are not equivalent. Based on the findings, it was recommended among others that (i). Education authorities should review their stands on the equivalence by government fiat placed on the two examinations conducted by WAEC and NECO mathematics test-items.

CHAPTER ONE

INTRODUCTION

Background to the Study

Evaluation is a major educational tool used in the identification of individual talents and skills for placement of students at appropriate learning programmes or vocations. This, in effect, is the idea behind the establishment of evaluation agencies which also act as examining bodies that maintain a common standard in test development and administration of public examinations. Nworgu (2006) maintains that these agencies were set up to promote education, coordinate educational programmes, control and monitor the quality of educational institutions.

These agencies organize public examinations which provide uniform standards to all test takers, irrespective of the type or method of instruction they have received. Some of these examination bodies in Nigeria are; the West African Examination Council (WAEC), National Examination Council (NECO), Joint Admissions and Matriculation Board (JAMB), National Business and Technical Examination Board (NABTEB) among others. A close look at the functions of these boards reveals that some of them perform similar functions. For instance, WAEC, NECO, and NABTEB all conduct senior secondary school leavers' certificate examinations but in the case of NABTEB, the examination is targeted only at secondary school leavers of technical and vocational colleges in Nigeria.

Nkwocha (2015) states that, just three examining bodies; WAEC, NECO and NABTEB are responsible for the award of senior school certificate in Nigeria. They conduct parallel or equivalent senior school certificate examinations in the country. They maintain high standards in the development and administration of the examinations, of which performances in the examinations should be good indicators of individuals' standing in any subject area of interest. Both examining bodies follow uniform mode of test construction, following the rigorous standardization procedures, administration, scoring and interpretation.

WAEC was established in 1952 by acts of the British West African Colonies with headquarters in Accra (Ghana) and national offices in the capital cities, viz: Lagos (Nigeria), Freetown (Sierra-Leone) and Bathurst (nowBanjul Gambia), and each national office is headed by a very senior WAEC staff from that country.

WAEC carries out the following major examining functions:-

i. Conducting national examinations which are unique to and required by each of the member countries. These include common entrance examinations to secondary schools, nurses selection tests, entrance examinations to the Nigeria Defence Academy and variety of selection tests for various trades and vocations.

ii. Conducting international examinations: It includes principally the West African Senior School Certificate Examination (WASSCE) in the

English speaking West African countries of Nigeria, Ghana, Sierra-Leone, Gambia and Liberia.

iii. Conducting examinations in collaboration with other examining bodies: These include the General Certificate of Education (GCE) of the University of London School Examination Council (popularly known as the 'O' Level) as well as the Advanced Level Examinations ('A' level) of the same body. They also include the examinations of the Royal Society of Arts (RSA) of London, the City and Guilds of London, etc.

iv Conducting examinations on behalf of other examining bodies: These include Test of English as a Foreign Language (TOEFL) administered on behalf of United States Foreign Missions, Embassies and Universities and the Scholastic Aptitude Tests.(SAT) etc, administered on behalf of Educational Testing Service (ETS) of the USA.

Following an increasing agitation for the creation of a National Examination body that will be equivalent to WAEC in functions and to minimise the frustration experienced by candidates due to WAEC monopoly, the National Examination Council, NECO was established. According to Nwana (2007), the National Examinations Council (NECO) bill was passed into law in 2001 and between its creation in 1999 and passing of the bill, it operated under the National Board for Educational Measurement (NBEM) Act 69 of 1993 having its Headquarters in Minna. The establishment of NECO was not to compromise the place of WAEC, rather the efforts and policy directives that brought it into being ensured that the academic standard of the NECO Senior School Certificate was to be the same as that of WAEC at that level, including such examining features as the style of developing the examination papers, the marking and grading of papers etc. The National Examination Council conducts national examinations such as:

i. Junior School Certificate Examination (JSCE),
ii. Examinations into schools for the gifted children,
iii. Senior School Certificate Examination (SSCE),
iv. National Common Entrance Examination (NCEE).

Generally, stakeholders in education (Government, teachers and parents) have it that NECO and WAEC tests are equivalent. Evidence of this equivalence is shown in the requirement for admission of candidates into tertiary institutions in Nigeria. These higher institutions require that a student must possess a minimum of five credit passes including mathematics and English language in either WAEC or NECO or a combination of the two.

Of the five required credit passes in school subjects, Mathematics is known to be the most fundamental and useful tool in the technological advancement of any nation (Abiodum, 2005). Furthermore, it has been described as the most useful instrument in commerce, physical sciences, engineering, social sciences, industry, medicine and biological sciences (George, 2007). Considering the fact that NECO was established to be equivalent to

WAEC, it is reasonable to expect that the performance of examinees in the test being conducted by the two examining bodies should be comparable.

However, the statistics of students' performance in mathematics tests from year 2005 to year 2014 of the two examining bodies appeared to be at great variance (National Bureau of Statistics, 2015). For example, in year 2008, the statistics show that WAEC recorded 57.24% passes at credit level (i.e., A1 – C6), while NECO recorded more than 70% credit level passes. In fact since the inception of NECO till date, the results of the two examining bodies have always been characterized by variation in performance levels of candidates in the examinations. One then is left to question the equivalence of NECO and WAEC tests since the disparity between the performances of students in the two tests of the examining bodies are so much, perhaps, the tests are not comparable.

Evaluation of tests comparability, especially tests that are designed to measure the same construct (e.g., students' abilities) are usually achieved by empirically comparing the test scores produced by the two tests. Generically, evaluation of the comparability of test scores on two tests is done through a process called linking (Kolen & Brennan, 2004). According to Holland (2007), linking refers to the general class of transformations between the scores from one test and those of the other. Holland added that linking transformations can be developed in a variety of methods that reflect the similarities and differences between the tests as well as the uses to which the links are to be put.

Holland and Dorans (2006) divided linking methods into three basic categories: predicting, scale aligning and equating. Among these methods of linking, only the equating method evaluates the equivalence of tests whose test scores are intended to be used interchangeably (Dorans & Walkers, 2007; Hambleton, Swaminathan & Rogers, 1991; Holland, 2007; Kolen & Brennan, 2004).

In order to conclude that two tests are equivalent and that the test scores obtained from the tests can be used interchangeably, five conditions are widely required to be fulfilled by the tests (Holland & Dorans, 2000; 2006; Petersen, 2007). These conditions include:

i. The equal ability requirement;

ii. The equal reliability requirement;

iii. The symmetry requirement;

iv. The equity requirement; and

v. The population invariance requirement.

However, Petersen (2007) showed that requirements “iv” and “v” respectively explain why both requirements “i” and “ii” should be used in the evaluation of tests equivalence. As a result, this study evaluated the equivalence of WAEC and NECO mathematics tests using requirements i, ii, and iii.

The equal ability condition requires that the tests should measure the same ability of examinees. In the context of this study, this requirement implies that WAEC and NECO mathematics tests should measure the same ‘mathematics ability' of the students. Evaluation of this criterion/requirement can be achieved through several approaches. Prominent among these approaches is the Reduction in Uncertainty index (RiU) (Dorans, 2000). This index is estimated using the correlation coefficient of the test scores obtained by examinees on the two tests. Dorans (2000) state that when the index of RiU estimated for two test scores is greater than 50%, it is concluded that the tests are close enough to measure the same ability.

Test scores obtained by examinees in achievement tests can be estimated under the two major measurement frameworks used in educational testing- the classical test theory (CTT) and item response theory (IRT). The CTT approach estimates observed scores of examinees while IRT approach estimates ability scores of examinees (Hambleton & Jones, 1993; Kolen & Brennan, 2004).

In the present study, the IRT approach to test score estimation was adopted. This is because the ability estimates under IRT are independent of the number of items contained in the test that are used to compute their values. This is unlike the CTT observed scores that depend largely on the number of items in the test that are used in the estimation of their values (Hambleton, Swaminathan & Rojers, 1991). More importantly, the IRT approach to test score estimation has been found to work better than the CTT counterpart (Adegoke, 2014). In using IRT framework, it is important to evaluate which of the IRT models is the most appropriate for the data of interest. Item response theory models have been developed for tests whose items are scored dichotomously (0 or 1) as well as tests whose items are scored polytomously (e.g., essay tests in which examinees can earn a score of 0, 1, or 2 or more on each item) (Kolen & Brennan, 2004). Because this study emphasizes multiple choice tests whose items are scored dichotomously, the IRT models for dichotomously scored items was adopted.

According to Kolen and Brennan (2004), item response theory models for dichotomously scored test items assumes that examinee ability is described by a single latent variable referred to as theta (θ), defined so that theta lies between -∞ and + ∞. The use of a single latent variable implies that the construct being measured by the test is unidimensional. For test items that are dichotomously scored, there are three parameter models. These are: three-, two- and one parameter logistic models. These models provide mathematical equation for the relation of the probability of an examinee answering an item correctly as a function of the item's parameter(s) and the underlying ability that the test intends to measure (Baker, 2001).

The use of the models is governed by two basic assumptions which must be fulfilled for accurate item and person parameter estimates to be obtained. These assumptions include; unidimensionality, and local independence (Demars, 2010). Furthermore the choice of which of the models that is the most appropriate for item and person estimates depends largely on the model-data fit (Demars, 2010).

Unidimensionality means that the model has a single θ for each examinee, and any other factors affecting the item response are treated as random error or nuisance dimensions unique to the item and not shared by other items. According to Hambleton et. al (1991), what is required for this assumption to be met adequately by a set of test data is the presence of a “dominant” component or factor that influences test performance. Many methods have been proposed for testing unidimensionality. Prominent among the methods is analysis of the eigenvalues (roots) of the inter-item correlation matrix (Demars, 2010). According to Lord (1980), when the eigenvalue of the first factor is substantially greater than the second then the data can be assumed to be approximately unidimensional. Specifically a test is adjudged unidimensional when the ratio of the eigenvalue of the first component to the second component is probably 2 to 1 (2:1) or more. However, the extent of unidimensionality of a test increases as the ratio of the eigenvalue of the first component increases from 2. This implies that a test with eigenvalues whose ratio of the first component to the second component is 3 to 1 (3:1) is more unidimonsional when compared with a test with eigenvalue whose ratio of the first component to the second component is 2 to 1 (2:1) (Demars, 2010).

On the other hand, item local independence states that the probability of an examinee answering a test item correctly is not affected by his/her performance on any other item in the test (Nenty, 2004). Assessment of item local independence is usually achieved by outright tetrachoric/polychoric correlation among items response on a test (Ubi, 2006 cited in Ubi, Joshua, & Umoinyang, 2011). According to Ubi et al (2011), an item is considered locally independent, if the tetrachoric/polychoric correlations among the items are not significantly different from zero.

Model- data fit issues are of major concern when applying item response theory models to real data (Steven, 1990). In fact when a model is not appropriate or does not fit the data, use of estimated parameters may be compromised (Stone & Zhang, 2003). Typically, IRT practitioners focus on the fit of individual items, not on overall fit of the model across all items. This is usually assessed by using all the models for calibrating the data of interest. The model that best fits the data is obtained by the count of the number of items deleted by each model. The model that deletes the smallest number of items is usually adjudged the model that fits the data (Wiberg, 2004). As noted by Demars (2010), violation of these assumptions may lead to misestimation of parameters (items and examinees ability).

It is reasonable to adjudge two tests that are able to fulfil the equal ability requirement as being equivalent. However, researchers (Dorans & Holland, 2000; Petersen, 2007) showed that tests that measure the same construct but differ in reliability should not be considered equivalent. This implies that the equal reliability requirement is equally important in evaluating the equivalence of two tests.

Reliability, the extent to which an instrument measures consistently what it is designed to measure is important for two reasons. These reasons are; (1), reliability provides a measure of the extent to which an examinee's test score reflects random measurement error and (2), reliability is a precursor to test validity. That is, if test scores cannot be assigned consistently, it is impossible to conclude that the test scores accurately measure the domain of interest (Wells & Wollack, 2003). Thus, reliability is a central notion in educational measurement and classical test theory. Within item response theory, test reliability is estimated using the information function of the individual item that makes up the test (Baker, 2001). This reliability in the parlance of IRT is usually estimated as empirical reliability by IRT softwares (e.g BILOG MG) (De Ayala, 2009).

Evaluation of reliability of two tests for the purpose of equivalence assessment requires that the two tests should have equal reliability estimates. However, LiU and Walker (2007), stated that equality of reliability is a necessary but not sufficient condition for tests equivalence. In addition, high reliability is needed to ensure that the equivalent test scores are informative enough to be acceptable (Dorans, 2004). According to Cohen and Swerdlik (2009); Kline (2000) and Kline (2005), this value of reliability should not drop below 0.7.

The third requirement that must be fulfilled by two tests in addition to equal ability and equal reliability requirements is the symmetry requirement. Specifically, symmetry condition requires that the transformation used in equating tests must be symmetric (Lord, 1980). This implies that, the function used to transform test scores on test 1 to the scale of test 2 must be the inverse of the function used to transform test scores on test 2 to the scale of test 1.

Evaluation of this requirement is determined using scatterplots of the equating functions. According to Kolen and Brennan (2004; 2014), the functions are symmetrical when for example, an ability score of +2 on test 1 converts to ability score of +3 on test 2 scale, then an ability score of +3 on test 2 must convert to ability score of +2 on test 1 scale.

Transformation of tests' scores of one form to scale of another form can be achieved through tests equating procedures of the classical test theory (CTT) and item response theory (IRT). The CTT approach makes use of observed scores of the testees while the IRT makes use of the ability estimates of the examinees (Kolen & Brennan, 2004). However, in the present study the IRT approach was adopted. This is because the ability estimates under IRT are independent of the samples (number of items) that are used to compute their values. More importantly, the IRT approach to test equating has been found to work better than the CTT counterpart (Fan, 1998; Harmbleton, Swaminathan & Rojers, 1991).

Under IRT, four methods are used in the transformation of ability estimates on one test form to the scale of another test form (Kolen & Brennanm, 2004). These methods of transformation include: mean/sigma, mean/mean, Haebara Test Characteristics Curve, and Stocking and Lord Test Characteristics Curve. The choice of any of the transformation methods for test score transformation is often dictated by the data collection design used for the test forms to be transformed. Majorly, there are three data collection designs used in

IRT equating; they are (a) single group, (b) random group and (c) anchor test designs (Kolen & Brennan, 2004). In the single group design, one group of testees taken from one population takes the test forms to be equated. In the random group design, two randomly selected groups, of equivalent ability taken from the same population, take different forms of the test. In the anchor test design two groups of examinees taken from two different populations take different forms of the test, with each form containing a set of common items.

According to Kolen and Brennan (2004), the mean/sigma method of transformation is used when the data collection design employed for test equating is the single group design while the mean/mean or mean/sigma method is used when the random group design is used for data collection. But any of the mean/mean, mean/sigma, Haebara test characteristics curve, stocking and Lord test characteristics curve methods can be used when the anchor test design is employed for data collection. Furthermore, the choice of design-single group, random group, or anchor test– is often dictated by practical constraints of the testing program (Cook & Eignor, 1991).

In the present study which emphasized NECO and WAEC tests, the single group design was adopted. This is because of the need to ensure that variation in test scores, if any, is not a function of heterogeneity of samples. Consequently, the mean/sigma transformation method was adopted in the study.

Mean/sigma transformation method under the single group makes use of the means and standard deviations of the ability estimates of examinees on test forms to transform the examinees' ability estimates on test forms from the scale of one form to the other form. According to Kolen and Brennan (2004), examinees' ability estimates on one test form can be placed on the scale of another test form by equating the standardized ability estimates of examinees on the two test forms.

Quite a number of empirical enquiries in Nigeria have been advanced to assess the extent of comparability of WAEC and NECO tests. For example, Kolawole (2007) compared the psychometric properties of NECO and WAEC mathematics multiple choice tests and found that the reliability and validity coefficients of the two tests were similar. Other empirical studies (Bamidele and Adewale, (2013) and Obinne, (2008) laid credence to the finding of Kolawole (2007). Although Anagbogu (2009), found that NECO items were more difficult than WAEC items, this result was based on the discrimination parameters of the two tests used in the empirical study.

Based on available empirical studies, it appears that the focus of research on establishing the comparability of WAEC and NECO at least in Nigeria have always been centred on only the psychometric properties of the tests of the examining bodies. To a large extent, a lot of features regarding the extent of the equivalence of WAEC and NECO mathematics tests are empirically unknown. Specifically, there is no known study in Nigeria that has assessed the equivalence of WAEC and NECO mathematics tests in terms of the traits which the tests purport to measure; the equivalence of the reliability of the tests, the equivalence of the local independence of the tests' items. More importantly, the application of item response theory in assessing the equating of the test scores obtained from the two tests is indeed rare. Furthermore, whether or not scores obtained from the two tests could be used interchangeably was unknown.

Statement of the Problem

The West African Examination Council (WAEC), in the early days of its inception, was the only examining body in Nigeria saddled with the responsibility of measuring, assessing and certifying senior secondary students' proficiency in school subjects.

Nwana (2007) noted that the establishment of National Examination Council (NECO) was not to compromise the place of WAEC, the efforts and policy directives that brought it into being ensured that the academic standard of the NECO Senior School Certificate was to be the same as that of WAEC at that level, including such examining features as the style of developing the examination papers, marking and grading of papers, etcetera. Ever since then tertiary institutions in Nigeria require for admission minimum of five credit passes which include mathematics and English language in either WAEC or NECO or a combination of the two. This suggests that the WAEC and NECO tests (especially mathematics) are equivalent and the test scores can be used interchangeably.

Although stake holders in education believe that tests of the two examining bodies are equivalent, the statistics of results of students that sat for the examinations show different picture as a lot of disparities were observed between levels of students' performance in the results of the two examining bodies' examinations. However, to a large extent, there is no empirical justification for this claim of equivalence by stake holders as there is a dearth of literature on the extent of equivalence of WAEC and NECO tests. The few studies done on the comparison of WAEC and NECO mathematics tests and other senior secondary certificate examination subjects limited their enquiries to reliability estimates of the two tests with no attention given to the extent of equivalence of the two tests and the extent to which the tests can be used interchangeably. Furthermore, test conducted by WAEC is often perceived by the public as being superior to those conducted by NECO because of its international outlook and years of operation. However, this assertion is yet to be proved empirically. Hence, the extent of equivalence of tests of NECO and WAEC appears to be largely unknown. There is need for more in-depth studies.

This study therefore, assessed the equivalence of WAEC and NECO mathematics tests using the tests interchangeability criteria of test equating in the measurement framework of item response theory.

Purpose of the Study

The main purpose of the study was to assess the equivalence of mathematics multiple choice tests of NECO and WAEC from 2011 to 2014; ascertain if the test scores obtained on the tests could be used interchangeably using the criteria for assessing tests score interchangeability and finally ascertain the unidimensionility and local independence of the tests.

Specifically, the study set out to:

1. assess the unidimensionality of NECO and WAEC mathematics multiple choice tests from 2011 – 2104
2. assess the local independence of NECO and WAEC mathematics multiple choice test items from 2011-2014
3. compare the local independence of NECO and WAEC mathematics multiple choice test items from 2011 – 2014
4. ascertain if the NECO and WAEC mathematics multiple choice tests of 2011 – 2014 measured the same mathematics ability of examinees.
5. estimate the reliability estimates of NECO and WAEC mathematics multiple choice tests from 2011 – 2014
6. assess how symmetrical the equating functions for placing the ability estimates of examinees in WAEC test on the scale of NECO test are and vice versa.

Significance of the study

This study which was designed to assess the equivalence of mathematics multiple choice tests of WAEC and NECO, is significant in many ways to examining bodies, parents, Ministry of Education and stakeholders.

The result would help examining bodies to appreciate the usefulness of test equating in determining the extent of equivalence of achievement tests developed from the same content area and intended for the measurement of the same construct.

The findings of the study would help to disabuse the minds of parents that the results obtained by their wards on WAEC and NECO mathematics tests are equivalent, despite the order/claim by government that they are equivalent.

The findings of the study would inform the Federal Ministry of Education, on the need to establish a central body that will be saddled with the responsibility of ensuring that WAEC and NECO tests are as equivalent as possible. This body will serve as monitoring team for the maintenance of the expected standards in setting of the examination, conduct of examinations and certification.

More importantly, the findings of this study would provide information to stakeholders regarding, the equivalence of WAEC and NECO mathematics tests and whether the test scores of mathematics tests of the two bodies can be used interchangeably.

The study would also be a very useful reference material to future research students who may wish to investigate this issue further, as well as those who may which to carry out other comparative studies.

Scope of the Study

The item statistics of any test item are many but the researcher intends to focus on the unidimensionality of the test item, local independence of test items, test score equating of the examination papers. The study restricted it's scope to the Senior Certificate Examinations that were conducted by two examination bodies (WAEC and NECO) from 2011 to 2014.

Research Questions

The following research questions were answered in the course of this study.

1. How unidimensional are the SSCE mathematics multiple choice test items of NECO and WAEC?
2. How locally independent are SSCE mathematics multiple choice test items of NECO and WAEC?
3. How equivalent are the local independence of SSCE mathematics multiple choice test items of NECO and WAEC?
4. To what extent do SSCE mathematics multiple choice tests of WAEC and NECO measure the same construct (i.e., mathematics proficiency)?
5. How reliable are NECO and WAEC mathematics multiple choice tests?

6. Are the equating functions for placing the ability estimates of examinees in mathematics test of WAEC on the scale of mathematics test of NECO and vice versa symmetrical?

HYPOTHESES

The following null hypotheses were tested at 0.05 level of significance

1. There is no significant relationship between the unidimensionality of NECO and WAEC Mathematics multiple- choice test
2. There is no significant difference between the reliability estimates of NECO and WAEC Mathematics multiple -choice test.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Literature related to this study was reviewed under the following headings:-

Conceptual Framework

Unidimensionality of test items

Local independence and test items

Reliability of a test

Test score equating

Theoretical Framework

Item response theory (IRT)

Theoretical Studies

IRT models

Applications of IRT

Model-data fit

Different forms of estimating reliability

Test equating requirements

Empirical Studies

Unidimensionality of tests

Local independence of test items

Reliability estimates of tests

Test equating

Summary of Review of Related Literature

Conceptual Framework

Unidimensionality of test items. Item response theory (IRT) assumes that there is a single latent trait which is sufficient to explain or account for examinee's performance, referred to as one dimensional. One dimensional test may be defined simply as a test in which all items are measuring the same trait. Unidimensionality, therefore means that any item developed should test one area of knowledge and nothing else (Joshua, 2005). This in actual sense implies that there are divergence of test items, which should all converge to measure a particular area of knowledge. For example, a mathematics test that contains some items that are strictly computational and other items that involve verbal material likely is not unidimensional.

According to Sitjsma and Bram (2006), unidimensionality assumes that a single latent ability or a homogenous set of items to be tested is sufficient to explain examinee performance. This means that the items that collectively measure a unique underlying latent trait for each examinee and that only one latent trait influences the item responses. Other factors affecting these responses are treated as random error (Demars, 2010). This assumption relates to construct validity, since the test must only measure that particular construct, it is designed to measure. For instance, a test designed to measure depression must only measure that particular construct, not closely related ideas such as anxiety or stress. Nworgu (2015) stated that construct validity is concerned with the extent to which research instrument measures one particular psychological (social) construct. This is a strong assumption and may not be reasonable in many situations as tests or survey instruments may be designed to measure multiple traits.

According to Hambleton et al (1991), what is required for this assumption to be met adequately by a set of test data is the presence of a "dominant" component or factor that influences test performance. Many methods have been proposed for testing unidimensionality. Prominent among the methods is analysis of the eigenvalues (roots) of the inter-item correlation matrix (Demars, 2010). According to Lord (1980), when the eigenvalue of the first factor is substantially greater than the second then the data can be assumed to be approximately unidimensional.

Local independence of test item. Item local independence states that the probability of an examinee answering a test item correctly is not affected by his/her performance on any other item in the test (Nenty, 2004). In other words, the knowledge of item 1 should not aid an examine to answer item 2. However this assumption has never been met precisely, for this reason, Joshua (2005) suggested that chain items should be avoided.

In applying the IRT models, the local independence assumption is one of the important features. This assumption means that for every examinee's response Y_{pi}=0 or 1 (where 0 denotes an incorrect response and I denotes a correct response) to the items I are statistically independent. In other words, the examinee's performance on one item is not influenced by the correctness of answering the other items (Sitjsma & Brain, 2006). The local independence assumption implies that there are no dependencies among items other than those that are attributable to latent ability. One example where local independence likely would not hold is when tests are composed of sets of items that are based on common stimuli, such as reading passages or chapters. In this case, local independence probably would be violated because items associated with one stimulus are likely to be more related to one another than to items associated with another stimulus. (Kolen & Brennan, 2004).

Local independence, also indicates that if the assumption of unidmensinality holds, then the response of a subject to one item will be independent of his or her response to another item, conditional on the latent trait. In other words, if items are locally independent, they will be uncorrelated after conditioning on θ_j (Demars, 2010). Assessment of item local independence is usually achieved by outright tetrachoric/polychoric correlations among item responses on a test (Ubi, 2006 cited in Ubi et al. 2011). According to Lord (1978) in Ubi et al (2011), an item is considered locally independent, if the tetrachoric/polychoric correlations among the items are not significantly different from zero.

Reliability of a Test. Reliability is an essential quality in any kind of measurement. It is the degree of consistency with which it measures whatever it is measuring. According to Okoye (2015), the reliability of an instrument is a measure of the extent to which the instrument consistently measures what it intends to measure. Cozby and Bates (2012) defined reliability as the consistency or stability of a measure of behavior. Abonyi (2011) viewed reliability as the extent to which we can attribute individual differences in test scores to true difference. Test reliability can also be defined as the degree to which test items consistently measure any phenomenon they measure and the degree to which the same responses repeatedly given to the same questions repeatedly attract the same score (Nkwocha, 2007). This implies that it is repeatability or replicability of measurement.

Test Score Equating. Test equating is a statistical procedure, used to ensure comparability of test forms built with the same content area for the measurement of the same construct. According to Michealides and Haertel (2004), test equating is the statistical process that establishes comparability between alternate forms of test built to the same content and statistical specifications by placing scores on a common scale; thus allowing interchangeable use of scores on these forms .

Equating could be described as the relationship between scores of different forms that are constructed according to the same content and statistical specifications (Kolen & Brennan, 2004). Equating adjusts for difference in difficulty among forms that are built to be similar in difficulty and content.

Theoretical Framework

Item response theory

According to Baker (2014), item response theory is the study of test and item scores based on the assumptions concerning the mathematical relationship between abilities and item responses. This implies that the item response seeks to establish a relationship between the characteristics of the examinees, the individual test item parameters and the response to each item. It holds that there some latent traits in examinees that are not directly measurable or observable but are assumed to underlie a test performance. We can therefore say that the IRT states that the probability that an examinee with a given latent trait (θ) gets an item right is dependent on the examinee's ability and item characteristics (parameters).

Item response theory is not single theory postulated by a single individual. It evolved as a result of the works of a number of individuals. According to Ainsworth, (2016), IRT refers to a family of latent trait models used to established psychometric properties of items and scales. Sometimes it is referred to as modern test theory to differentiate it from classical test theory (CTT).

Paul Lazardsfeld, a mathematical sociologist was the first to initiate and introduce the term "Latent – Trait" in measurement theory in 1950. Lazarsfeld developed a set of mathematical models closely akin to factor analysis models. His work included both models that could be used with continuous and categorical variables, as in the case of factor analysis. Lazarsfeld's models attempt to explain relationships among observed variables in terms of one or more unobserved (Latent) variables which is referred to as traits, while the developmental level score is latent – trait score, which is a special kind of factor score. Lazarsfeld called both the categorical and continuous variable models latent – trait models.

The work of Frederic Lord in 1952 gave birth to Latent – trait theory. Lord in various ways sustained the activities of IRT since he was interested in the relationship between an individual's response to test items and characteristics of the items. Then, until when Richardson (1956) derived relationship between item response theory model parameters and classical item parameters, which provided an initial way for obtaining item response theory parameter estimate. Subsequently, Birnbaum (1965), Rasch (1960), Wright (1967), Lord and Norvick (1968), Wight and Panchapa, Kesan (1974), Akpan (1989), in one way or the other contributed to the development and popularity of items response theory. These experts contributed in their own ways for the development and sustenance of item response theory.

Thus, IRT is the most significant and popular development in psychometrics to overcome the shortcoming of classical test theory and maximize objectivity in measurement (Joshua, 2005). Anderson & Morgan (2008) submits that IRT allows an item to be characterized independently of any sample of items administered to the person. Thus, IRT is very useful when multiple set of items are administered to students in an assessment. It is against this background that IRT is the theoretical framework on which the study was anchored. Therefore, the present study relates to this theory because it aims at assess the equivalence of WAEC and NECO mathematics multiple-choice tests using item response theory (IRT) from 2011 to 2014. Also assess the extent to which the test scores obtained on the tests can be used interchangeably using the criteria for assessing tests unidimensionability and local independence.

Theoretical Studies

IRT models. IRT models are mathematical functions that specify the probability of a discrete outcome, such as a correct response to an item, in terms of person and item parameter (Zairul & Adibah, 2010). IRT models show the relationship between the ability or trait (symbolized θ) measured by the instrument and an item response. The item response may be dichotomous (two categories), such as right or wrong, yes or no, agree or disagree. Or, it may be polytomous (more than two categories), such as a rating from a judge or scorer or a likert – types response scale on a survey. The construct measured by the items may be on academic proficiency or aptitude, or it may be on attitude or belief (Demars, 2010). IRT models are commonly used to model the latent traits associated with a set of items or questions in a test or survey.

IRT models describe the interactions of person and test items (Reckase, 2009). Therefore, to describe a relationship between the examinees' ability and performance on an item, one employs one or more parameters depending on the

IRT model appropriate in use. The models are referred to as logistic parameter models. These models are one-parameter logistic model (1PL), two-parameter logistic model (2PL) and three– parameter logistic model (3 PL) (Baker, 2001).

*One-parameter Logistic model***.** This model is also called the Rash model, which was a major focus of the Danish mathematician, George Rasch. The Rash model involves a rigorous perspective that is distinguished not only by its adherence to the IRT assumptions, but also by its emphasis on high quality items and internal scales (Bond & Fox, 2007; Embretson & Reise, 2000). The Rash model estimates the probability of answering the item correctly as a logistic function of the difference between the individual's ability and the item difficulty. Thus, the Rash model allows us to create an internal scale of scores for both the item's difficulty and individual's ability, and these scores are scaled in logits (Baker, 2004). The Rash model, or the one parameter logistic (IPL) model, specifies that the item difficulty is the only item characteristic that varies from item to item holding the item discrimination values equal for all items. Because there is only one parameter to be estimated, this model does not require large sample size. Previous research suggested that a sample size of as large as 200 examinees would be sufficient to accurately estimate item parameters of the IPL model (Chang, Hanson & and Harris, 2000).

One- parameter logistic model (1PL)

$P(\theta) = \frac{1}{1+e^{-1(\theta - b_i)}}$ ------------------------------ eqn1.1

Where P(θ) is the probability of correct response to an item,

e = 2.72828…, (exponential constant)

bi = difficulty parameter of item i known under 1RT as item location parameter

The Rash analysis is centered on estimating the probability of success of the test-taker on a specific item. The use of Rash analysis contributes to the normalization of test curves. Just as CTT has four indicators to assess the adequacy of the items, Rash models have statistics to evaluate the fit of the item into the model (Limacre, 2008). The idea underlying these statistics is that correct answers in more difficult item are accompanied by people with higher ability. At the same time, these people will have a greater probability of attaining higher scores on easier items than on more difficult ones.

Two parameter logistic model:- Orluene (2010) records that this model proposed by Birnabaum (1968) contains two item parameter (difficulty and discrimination indices) and latent ability omitting the guessing parameter, which is designated as “a” for discrimination and “b” for difficulty as opposed to one –parameter model which was limited to difficulty “b”. The function of the discrimination parameter is that, it allows the item characteristics curve (ICC) for various items to exhibit different slopes and further confirms that some items have a stronger or weaker relationship with the underlying construct (Θ) being measured than others. Due to the item characteristic curve, the slope of the curve is a function of the ability level and reaches the maximum value difficulty (Baker, 2001).

The equation for the two – parameter logistic model is given by:

Two-parameter logistic model (2PL)

$P(\theta) = \frac{1}{1+e^{-a_i(\theta - b_i)}}$ ------------------------------eqn1.2

Where $P(\theta)$ is the probability of correct response to an item,

e = 2.72828…, (exponential constant)

a_i= discrimination parameter of item i, conceptually known under 1RT as item slope

bi = difficulty parameter of item i known under 1RT as item location parameter, and

Three parameter logistic model: This model adds a guessing parameter as the third descriptor of the item characteristic curve. When the guessing parameter is taken into account, it shows that in many items, even if the examinee does not know anything about the subject matter (Θ = -5), he or she can still have some chance (p>o) to get the right answer (Yu, 2013). The 3- PL model is a more general model where the discriminating power is allowed to vary among items and guessing is allowed to occur for the examinees. However, in order to accurately estimate the 3pl item parameters, previous research suggested that at least 1,000 (Darmas, 2010; Reckase, 1979, Skaggs & Lissitz, 1986) to 10,000 (Thissen & wainer, 1982) examinees would be needed.

Estimating IRT item discriminating parameter requires larger sample sizes than estimating item difficulty parameters (Barnes & Wise, 1991)

The formula is given by

P *Three-parameter logistic model* (3PL)

$$P(\theta) = c_i + (1 - c_i)\frac{1}{1+e^{-a_i(\theta - b_i)}} \qquad \text{-------------------} \qquad \text{eqn1.3.}$$

Where P(θ) is the probability of correct response to an item,

e = 2.72828…, (exponential constant)

a_i= discrimination parameter of item i, conceptually known under 1RT as item slope

bi = difficulty parameter of item i known under 1RT as item location parameter, and

Ci = guessing parameter of the item i,

Application of Item Response Theory.

Umobong (2004) outlined the following as the applications of IRT in testing situations.

Item Banking:- Involves collection of test items, "stored" with known item characteristics and made available to test constructors. The invariance property of IRT parameter makes it possible to feed items into item banks, and recall them at will. With the objective nature of IRT, items are constructed, administered and tested for goodness of fit, and items found not to fit the model are eliminated while those that fit the model are stored.

Tailored Testing:- is the matching of the test item to the ability of the examinee, in other words, attempting to save the high ability examinee from too many trivially easy items and low ability examinee from too many hard items. IRT is important in tailored testing because it makes for the estimation of ability that are independent of the particular test items administered as such examinees can be compared even when they had taken different sets of test items.

Test Construction / Development. Test construction and development under IRT is more advantageous particularly in the aspects of item analysis, selection of items, test validity and reliability assessment. Items in IRT are said to be calibrated without reference to the items by a test of fit of the model.

IRT has been applied to the types of tests encountered in the areas of educational and psychological measurement. In developing tests using latent trait theory, it provides the test developer with sample invariant item parameters and a powerful method of item selection which depends on the test information function.

Test Bias:- Item bias is defined as a test item in which all individuals having same underling ability have equal probability of getting the item correct, regardless of subgroup membership. Items in a test that measure a single trait must measure the same trait in all subgroups of the population to which the test is administered. Items that fail to do so biased for or against a particular subgroup (Lord & Novick, 1991).

Criterion References Testing (Mastery Testing):- Criterion referenced tests are designed to determine the extent to which an examinee has reached a specific level of achievement, in which case, the examinee is said to be proficient or "master" of a particular skill tested. Particularly, a criterion – referenced test is based on a well defined set of tasks known as a universe of items or a domain.

In evaluating instruction, test developers are concerned with the proportion of tasks in the domain that a student can correctly perform. This proportion of task that a student can correctly master is defined as a student domain score or mastery level. The test developer then selects items from the pool that have the highest item information functions at that level.

This type of test measures precisely at the mastery level such that errors in classifying people are minimized. The advantages of application of IRT over CRT is that due to the invariance property of the parameter, it is possible to construct test tailored to meet specific ability level.

Test Score Equating. Test equating is a statistical procedure, used to ensure comparability of test forms built with the same content area for the measurement of the same construct. According to Michealides and Haertel (2004), test equating is the statistical process that establishes comparability between alternate forms of test built to the same content and statistical specifications by placing scores on a common scale; thus allowing interchangeable use of scores on these forms.

In large scale testing situation multiple and interchangeable forms of test are used. Classical test construction techniques do not assure that two or more forms of a test can be made equivalent in level and range of difficulty. At times the need for equating test from either horizontally or vertically using the same unit for the two forms arises. Hambleton et al (1978) opined that latent trait models allow equating scores using ability estimates, which helps to control for the problem of non – equivalent groups and that of constructing parallel forms of tests. This is due to its characteristics of parameter variance.

Model-data fit

In using IRT framework, it is important to evaluate which of the models is the most appropriate for the data of interest. The choice of which of the models that is the most appropriate for item and person estimates depends largely on the model-data fit (Demars, 2010). Model- data fit issues are of major concern when applying item response theory models to real data (Steven, 1990). In fact when a model is not appropriate or does not fit the data, use of estimated parameters may be compromised (Stone & Zhang, 2003). The above statement implies that the use of a model that does not fit the data well cannot provide good answer to the underlying scientific questions under investigations.

Typically, IRT practitioners focus on the fit of individual items, not on overall fit of the model across all items. This is usually assessed by using all the models for calibrating the data of interest. The model that best fits the data is obtained by the count of the number of items deleted by each model. The model that deletes the smallest number of items is usually adjudged the model that fits the data (Wiberg, 2004). As noted by Demars (2010), violation of these assumptions may lead to misestimation of parameters (items and examinees ability).

In assessing model-data fit, the best approach involves (i) designing and conducting a variety of analysis designed to detect expected types of misfit, (ii) considering the full set of results careful and (iii) making a judgment about the suitability of the model for the intended application. (Hambleton, 1991).

Different forms of estimating reliability: A reliability measure does not fluctuate from one reading to the next, if the measure does fluctuate, there is error in the measurement device. Therefore, a more formal way of understanding reliability is to use the concepts of true score and measurement error. Any measure that you make can be thought of as comprising two components: 1) a true score, which is the real score on the variable 2) measurement error. An unreliable measure of intelligence contains considerable measurement error and so does not provide an accurate indication of an individual's true intelligence (Cozby & Bates, 2012).

The question is, how can we assess reliability? We cannot directly observe the true score and error components of an actual score on the measure. However, one can assess the stability of measures using correlation coefficients.

According to Anastasi (1988) correlation coefficient (r) expresses the degree of correspondence, or relationship, between two sets of scores. It is also described as a number that tells us how strongly two variables are related to each other (Cozby & Bates, 2012). Correlation coefficients have many uses in the analysis of psychometric data. The measurement of test reliability represents in application of such coefficients. Therefore the most common correlation coefficient when discussing reliability is the Pearson product-moment correlation coefficient. The Pearson correlation coefficient (symbolized as r) can range from 0.00 to + 1.00 and 0-00 to -1.00. A correlation of 0.00 tells us that the two variables are not related at all. The closer a correlation is to 1.00, either + 1.00 or - 1.00, the stronger is the relationship. The positive and negative signs provide information about the direction of the relationship. When the correlation coefficient is positive; there is a positive linear relationship - high scores on one variable are associated with high scores on the second variable. A negative linear relationship is indicated by a minus sign - high scores on one variable are associated with low scores on the second variable.

Therefore to assess the reliability of a measure, one needs to obtain at least two scores on the measure from many individuals. If the measure is reliable, the two scores should be very similar. The index of reliability is usually the reliability coefficient. Hence, reliability coefficient is the statistic or an index that tells us the degree of consistency between two sets of scores obtained from the same group with one test (Onunkwo, 2002). There are various methods of establishing the reliability of a test. These include the following; test - retest, equivalent forms method, split half, Kuder Richardson and Cronbach alpha coefficients.

Test-retest Method. The test - retest method involves administration of one test twice on the same group of people, at a reasonable interval of time. The time interval could be short or long, depending on the nature of the attribute being measured. The scores they obtain at the two different occasions are correlated using an appropriate type of correlation. Pearson's product moment correlation is used for interval scores, while Spearman's Rank Correlation is used for ordinal data. A reliability coefficient estimated through the process of test - retest is regarded as a measure of stability.

Equivalent or Parallel Form or Forms Method. Here, two forms of a test are administered to the same group of students in close succession, and the resulting test scores are correlated. This correlation coefficient provides a measure of equivalence. This implies the degree to which both forms of the test are measuring the same aspects of behavior. A test developer or expert may have good reason to construct not just one test but two tests, one test being similar or equivalent or identical to the other in nearly all respects. Such tests according to Nwana (2007) are referred to as parallel tests. Therefore, they will be regarded as parallel if:

1. they both cover the same content and construct
2. each item in one test has its match in the other test in terms of difficulty and discrimination indices
3. they have the same rubric for administering, scoring, grading and scaling the answers.

Many standardized tests have more than one form. These forms of the same tests are said to be equivalent, parallel, or alternate forms. All forms of the same tests are said to be equivalent or parallel; that is, when they yield comparable raw scores from the same group.

Split *half Method.* This involves a single administration of one form of a test, where the test is administered to a group of subjects and later the items are divided into two comparable halves. Scores are obtained for each individual on the comparable halves and a coefficient of correlation is calculated for the two sets of scores. If each subject has a very similar position on the two sections, the test has high reliability. If there is little consistency in positions, the reliability is low. Coefficient obtained through this process is regarded as a measure of internal consistency.

However, this method of establishing reliability has a limitation and that is, the reliability coefficient so obtained is that of a half test because the full test is split into two. Therefore, to raise it to that of a full test the Spearman Brown Prophecy formula is applied. The formula is meant to raise the reliability coefficient of a half test to that of a full length test. The formula is given below

$$\text{Reliability of full test} = \frac{2 \text{ x reliability of } \frac{1}{2} \text{ test}}{1 + \text{reliability of } \frac{1}{2} \text{ test}}$$

Kuder - Richardson (K - R) Reliability Method. This involves using a single administration of a single form, which is based on the consistency of responses to all items in the test. Kuder - Richardson procedures stress the equivalence of all the items in a test, which are appropriate when the intention of the test is to measure a single trait. For a test designed to measure several traits, the Kuder-Richardson reliability estimate will usually be lower than reliability estimates based on a correlational procedure.

The two procedures for determining K-R reliability indices are K-R_2o and K-R_{21}.

K - R_{20} is applicable to tests whose items are scored dichotomously, that is, as either right or wrong; pass or fail. This technique does not required two halves of the test, rather it involves a thorough examination of testee's response or performance on each item of the test. This is applicable in objective test and the formula is

$$r_{xx} \quad \frac{K}{K-1} \left[\frac{S_x^2 - \Sigma pq}{S_x^2}\right]$$

where

K = number of items on the test

S_x^2 = variance of scores on the total test

P = proportion of correct responses on a single item

q = proportion of incorrect responses on the same item

K - R_2i can be used in both essay and objective tests. It is computationally simpler but requires the assumption that all items in the test are of equal difficulty, which is practically unattainable in test development. Although it is simple in operation, its use is bound to carry along a number of errors, which leads to the reduction of the reliability estimate. It is given by

$$r_{xx} = \frac{S_x^2 - \overline{X}(K-\overline{X})}{S_2^2 \quad (K-1)}$$

where

r_{xx} = the reliability of the whole test

K = the number of items in the test

S_x^2 = the variance of the scores

$\overline{X}$ = the mean of the scores

Cronbach's Coefficient Alpha. This is applied in estimating internal consistency of tests that are not dichotomously scored. Conbach alpha is used when measures have multiple scored items, such as attitude scales or essay tests. For example, on a Likert attitude scale the individual may receive a score from 1 to 5 depending on which option was chosen. Similarly, on essay tests a different number of points may be assigned to each answer. Cronbach's alpha provides us with the average of all possible split-half reliability coefficients. To actually perform the calculation, scores on each item are correlated with scores on every other item.

Abonyi (2011), noted that Cronbach procedure is allergic to the following:

- instruments that are dichotomously scored
- instruments that are not balanced (i.e. number of positively directed and negatively directed items)
- poor representation of construct

The formula for alpha is given by:

$$\propto \text{ or } r_{xx} = \left[\frac{K}{K-1}\right] \left[\frac{S_x^2 - \sum si^2}{S_x^2}\right]$$

Where

K = number of items on the test

$\sum si^2$ = sum of the variance of the item score

S_x^2 = variance of the test scores (all K items)

Inter-rater/Scorer/Marker's/Reader Reliability. This approach to estimating test reliability is applicable, especially for determining the reliability of scorers of essay tests. It requires several readers (examiners) who will assign marks to the same essays on agreed basis (using the marking scheme) and their scores are correlated to determine the reader reliability (Anikweze, 2010). Iwuji (1997) sees it as the degree of consistency with which a marker marks an essay script at different occasions.

It is also the level of agreement among group of markers over awards of marks in a given essay test script on different occasions. This type of reliability is assessed by having two or more independent judges score the test. The scores are then compared to determine the consistency of the raters' estimates. One way to test inter-rater reliability is to have each rater assign each test item a score. For example, each rater might score items on a scale from 1 to 10. Next, .you would calculate the correlation between the two ratings to determine the level of inter-rater reliability. Another means of testing inter-rater reliability is to have raters determine which category each observation falls into and then calculate the percentage of agreement between the raters, so if the -raters agree 8 out of 10 times, the test has an 80% inter-rater reliability rate.

The above approaches in applying the reliability of tests have been in classical test theory, but this study adopted the empirical reliability approached to IRT. Thus, reliability is a central notion in educational measurement and classical test theory. Within item response theory, test reliability is estimated using the information function of the individual item that makes up the test (Baker, 2001). These functions provide a sound basis for choosing items in test constructions. The item information function takes all item parameters into account and shows the measurement efficiency of the item at different ability levels. This reliability in the parlance of IRT is usually estimated as empirical reliability by IRT softwares (e.g BILOG MG) (De Ayala, 2009).

Under the item response theory framework, reliability is estimated by the volume of information provided by the individual item that makes up a test. As a result, the volume of information, based on a single item can be computed at any ability level and is denoted by $I_i(\theta)$, where *i* indexes the item" (Baker, 2001). When this volume of information is plotted against ability the resulting graph is called the item information (Baker, 2001). A very useful IRT property is that individual item information functions sum to test information,

$$I(\theta) = \sum_{t=1}^{n} I_i \theta \quad \text{---------- Eqn. 2. 31}$$

Symbolically, item information and Test information are defined respectively by:

$$I_i(\theta) = \frac{pi(\theta)^2}{p(\theta)[1-p(\theta)} \quad \text{---------- Eqn. 2.32}$$

$$\text{and, } I(\theta) = \sum_{t=1}^{n} I_i(\theta) \quad \text{----------- Eqn, 2. 33}$$

Where $P^1(\theta)$ is the first derivative of $P(\theta)$, and $p(\theta)$ is the probability of correct response to item *i* at some θ level (Leucht & Hirsch, 1992).

According to Zimowski et al (2003), the volume of information provided by a set of test items at any level is inversely related to the error associated with ability estimates at the ability level. The standard error of the ability estimates at ability level θ can be written as:

$$SE(\theta) \quad = \quad \frac{1}{\sqrt{1(\theta)}} \text{....... Eqn. 2. 33}$$

This standard error of measurement defines the precision with which an item measures examinee ability at a particular ability level.

Test equating requirement: Equating is the strongest from of linking between the scores on two tests. The goal of equating is to produce a linkage between scores on two test forms such that the scores from each test form can be used as if they had come from the same test (Dorans, Moses & Eignor, 2010). The above statement implies that score equating allows the scores from both tests to be used interchangeably. Strong requirements must be put on the blueprints for the two tests and on the method used for linking scores in order to establish an effective equating. Therefore, five requirements are widely viewed as necessary for a linking to be an equating (Holland & Doran, 2006). They are:

a. The equal ability requirement:- The two tests should both be measures of the same construct (latent trait, skill, ability). Evaluation of this criterion requirement can be achieved through several approaches. Prominent among these approaches is the Reduction in Uncertainty index (RiU) (Dorans, 2000). This index is estimated using the correlation coefficient of the test scores obtained by examinees on the two tests. Dorans (2000) stated that when the index of RiU estimated for two tests' scores is greater than 50%, it is concluded that the tests are close enough to measure the same ability. Mathematically, RiU is expressed by the relation:

$$\text{RiU} = 1 - \sqrt{1 - r^2}$$

Where, r = correlation coefficient between the two sets of test scores.

b. The equal reliability requirement:- The two tests should have the same level of reliability. Evaluation of reliability of two tests for the purpose of equivalence assessment requires that the two tests should have equal reliability estimates. However, LiU and Walker (2007), stated that equality of reliability is a necessary but not sufficient condition for tests equivalence. In addition, high reliability is needed to ensure that the equivalent test scores are informative enough to be acceptable (Dorans, 2004). According to Kline (2000); Kline (2005) and Cohen and Swerdlik (2009), this value of reliability for KR20 should not drop below 0.7.

c. The symmetry requirement:- The third requirement that must be fulfilled by two tests in addition to equal ability and equal reliability requirements is the symmetry requirement. Specifically, symmetry condition requires that the transformation used in equating tests must be symmetric (Lord, 1980). This implies that, the function used to transform test scores on test 1 to the scale of test 2must be the inverse of the function used to transform test scores on test 2 to the scale of test 1. Evaluation of this requirement is determined using scatterplots of the equating functions. According to Kolen and Brennan (2004; 2014), the functions are symmetrical when for example, an ability score of +2 on test 1 converts to ability score of +3 on test 2 scale, then an ability score of +3 on test 2 must convert to ability score of +2 on test 1 scale.

d. The equity requirement:- It should be a matter of indifference to an examinees as to which of the tests the examinee actually takes.

e. The population invariance requirement:- The equating function used to link the scores of x and y should be the same regardless of the choice of (sub) population from which it is derived. Dorans and Holland (2000) developed quantitative measures of equitability that indicate the degree to which equating functions depend on the subpopulations used to estimate them.

Data collection design used in test score equating. A variety of designs can be used for collecting data for equating. The group of examines included in an equating study should be reasonably representative of the group of examinees who will be administered the test under typical test administration conditions. The choice of a design involves both practical and statistical issues. The linking designs that permit the scaling of item parameters are the following:

Single-Group Design:- The single group design is the simplest data collection design. In the single group design, all examinees in a single sample of examinees from population (P) take both tests. The single group design can provide accurate equating results with relatively small sample sizes (Von Davier, Holland, Thayer, 2004).

Table 1: Design Table for the Single Group (SG) Design

Population	sample	x	y
p	I	ⓐ	ⓐ

Note ⓐ indicates examinees in sample for a given row take tests indicated in a given column.

Lack of @ indicates score data were not collected for that combination of row and column.

The single group design controls for any possibility of different examinee proficiency by having the same examinees take both tests. It has several major uses in practice of scaling and equating. In using this design, however, it is necessary to assume that an examinee’s score on the second test form is unaffected by the fact that he or she previously has taken the first form. That is, it must be plausible that practice and other types of order effects can be ignored. In the present study which emphasized NECO and WAEC tests, the single group design was adopted. This is because of the need to ensure that variation in test scores, if any, is not a function of heterogeneity of samples. Consequently, the mean/sigma transformation method was adopted in the study.

According to Von Davier et al, (2004), the design table for the single group design is given in Table

Equivalent group Design (EG):- The two tests to be linked are given to equivalent but not identical groups of examinees, chosen randomly (Kolen & Brennan 2004). In most equating situations, it is impossible to arrange for enough testing time foe every examinee to take more than one test. The simplest solution is to have two separate samples to take each form of the test. In the equivalent group design the equivalent samples are taken from a common population p, one tested with x and the other with y. Because examinees take only one test, the issue of order effects does not arise with the equivalent design.

The table for the equivalent group (EG) design is shown in Table 2

Table 2: Equivalent group design

Population	Sample	x	y
P	1	@	
P	2		@

Note: @ indicates examinees in sample for a given row take tests indicated in a given column.

Lack of @ indicates score data that were not collected for that combination of row and column

The equivalent group design is fairly convenient to administer. It does not require that the two tests have any items in common, but this design can be used even when they do have items in common. It also has some limitations. One limitation is that it requires large sample size to produce accurate equating results (Dorcans, Moses & Eignor, 2010)

Counterbalanced (CB) Design: In one method for counterbalancing, test booklets are constructed that contain form x and form y. One half of the test booklets are printed with form x following form y, and the other half are printed with form y following form x. In packaging, test booklets having form x first are alternated with test booklets having form y first. When the test booklets are handed out, the first examinee takes form x first, the second examinee takes form y first, the second examinee takes form y first, the third examinee takes form x first, and so on. When the booklets are administered, the first and second forms are separately timed. This spiraling process helps to ensure that the examinee group receiving form Y first is comparable to the examinee group receiving form X first (Kolen & Brennan 2004)

Table 3: Counterbalanced (CB) Design

Population	sample	x1	x2	Y1	Y2
P	1	@			@
P	2		@	@	

Anchor Test or Non equivalent Groups with Anchor Test (NEAT) Design. In anchor test designs there are two populations, P and Q, with a sample of examinees from p taking test x, and a sample from Q taking test y. In addition, both samples take an achor test (Kolen & Brennan, 2004). The role of the anchor test is to quantify the differences in ability between samples from P and Q that affect their performance on the two tests to be equated, x and Y. The best kind of an anchor for equating is a test that measures the same construct, that is x and y measures. The anchor A is usually a shorter and less reliable test than the tests to be equated (Dorcans, Moses & Eignor, 2010).

Table 4: None-Equivalent Groups with Anchor Test Design

Population	Sample	x	A	Y
P	1	@	@	
Q	2		@	@

The anchor test designs requires sample sizes somewhere in between those of the single group and equivalent group designs, although the sample size requirements depend on how strongly correlated the anchor test is with the two tests to be equated and how similar the two populations are. The non-equivalent groups anchor test design is used to collect data in situations in which it is not possible to administer the tests to be equated to the same or random equivalent groups (Doran, Pomerich & Holland, 2007)

Empirical Studies.

The review was conducted under the following headings:

Unidimensionality of test items

Local independence of test items

Reliability of a test

Test equating

Unidimensionality of test items

Metibemu (2016) carried out a study on the comparison of classical test theory and item response theory in the development and equating of physics achievement tests on Ondo State, Nigeria, a sample of 1423 students were used, factor analysis was used for assessing the Unidimensionality of the test. The result showed that the ratio of eigenvalue to the second eigenvalue was 2:1. Therefore, it was concluded that the tests were Unidimensional.

In a related study, investigated by Aliyu and Uruemu (2015) on the development and validation of mathematics achievement test (MAT) using the 3 – parameter logistic model of the item response theory, a sample of 1000 students were randomly selected from the population of all SS 3 students in Delta State. Data were obtained using the mathematics achievement test developed by the research. Factor analysis of principle component analysis (PCA) and rotated component matrix (RCM) was used to established the Unidimensionality of the items. The results showed that rotated factor locally matrixes ranged between 0.706 and 0.993 were obtained indicating that the MAT has construct validity which measure Unidimensionality traits.

Local independence of test item.

Oke (2012) investigated the local independence of West African Examination Economics test items using secondary school students from Ajeromi-Ifelodim Local Government Area of Lagos State. Tetrachoric correlation coefficient was used to find out the extent to which the items were locally independent. The result showed that there were 2450 correlations, out of which 1865 (76.1%) had coefficient close to zero, implying that Economics test items for 2010 Senior School Certificate Examination were locally independent.

In the same vein, a study was carried out by Ojerinde (2013) to ascertain local independence of University Tertiary Matriculation Examination (UTME) pre-test physics test items using vista-tetrachoric software. He grouped the tetrachoric correlation coefficient of physics test items into five groups, namely; (1), pairs of items having correlation coefficient that fell between 0.00 – 0.10 (termed very close to zero), (2), pairs of items having correlation coefficients that fell between 0.200 – 0.299 (termed close to zero), (3), pairs of items having correlation coefficient that fall between 0.300 – 0.449, (4), pairs of items having correlation coefficients that fell between 0.450 – 0.500, (5), pairs of items having correlation coefficients greater than 0.500.The result showed that, the percentage of correlation coefficients that were close to zero was 64.35%. Since a greater number of the correlation coefficients were close to zero, it was concluded that UTME pre-test physics items were locally independent.

Also Ubi et al (2011) carried out a study on item local independence of JAMB mathematics test items of years 2000 – 2003 in Cross River State. Tetrachoric correlation coefficient was used to locate the extent to which the items were locally independent. The results showed that in year 2000, out of 2601 inter-item correlations, only 17 (representing 56%) which were up to 0.45 and 2334 correlations (representing 89.73%), were approximately zero

(0). Similar correlations were observed for the other years, thus reflecting that the items were locally independent.

Olabode (2014) investigated on the comparison of local independence of 2012 NECO and WAEC mathematics tests' items. A sample of 500 SS3 students was selected from the population of all SS 3 students in Ogun State. Tetrachoric correlation coefficient was used to locate the extent to which the items were locally independent. The study gave rise to 2450 correlations and there appears not be any correlation in the pairs of items that fall all between 0.500 and above also 0.450 – 0.499. The inter-item correlations of 0.500 – .449 on items appears 1169 (96.54%), while a larger correlation of 1505 (97.04%) were close to zero (0). The result showed that WAEC and NECO test items of 2012 were locally independent. The study also found that the NECO 2012 mathematics test were more locally independent than the WAEC 2012 test items.

Reliability of a test

In a related study, Kolawale (2007) carried out a study comparing the psychometric properties of WAEC and NECO mathematics multiple choice items so as to ascertain whether the two papers were equivalent tests. The samples of the study were made up of 500 senior secondary school students randomly selected from ten local government areas of Ekiti State. Cronbach Alpha reliability principles were applied to obtain reliability coefficients of 0.86

and 0.83, respectively. The finding revealed that NECO and WAEC multiple-choice items were equivalent.

In a study investigated by Nnanemere, Nwaogu and Osunkwo (2010) on the reliability coefficient and validity indices of mathematics question papers set by NECO, a sample of 40 students that were purposively selected from the population of all SS III students in Government Secondary School, Owerri were used. Data were obtained using question papers .set by National Examination Council (NECO) in 2008. Using the split-half method, Kuder-Richardson's reliability, coefficient of internal consistency the value 0.75 and 0.69 were obtained indicating that test items set by NECO mathematics question papers were reliable.

Obinne (2008) also examined the psychometric properties of West African Examinations Council and National Examinations Council test items using item response theory. She used a sample of 1800 respondents drawn from the population of all year three SS 3 senior secondary school students who enrolled for the May/June/July 2006 biology senior school certificate examinations of WAEC and NECO in the three education zones of Benue State. Data were obtained using the WAEC and NECO 2000-2002 objective biology examination questions and analysed using the maximum likelihood estimation technique of the Bilog MG computer programme and t-test statistics. Result showed that the items were reliable; items of NECO examinations were relatively more difficult.

In a related study, Bamidele and Adewale (2013) did a comparative analysis of the reliability and validity coefficients of WAEC, NECO and NABTEB constructed mathematics examination questions, using final year students of secondary schools and technical colleges in Nigeria. A total of 600 students were used as sample. The researcher adopted past WAEC; NECO and NABTEB mathematics questions as instrument for the study. T - test, Fisher's transformation and Hotelling William test were techniques used for data analysis showing reliability coefficients of 0.89, 0.89 and 0.77 for WAEC, NECO and NABETEB respectively. The results of the findings showed that WAEC , NECO and NABETEB mathematics achievement tests were highly reliable. It also showed that the examination bodies are comparable and equivalent.

Anagbogu (2009) did a comparative analysis of WAEC and NECO Examinations and students’ ability parameters in mathematics objective test using the SS III students that took the 2004 examinations. The researcher adopting a stratified random sampling technique in drawing sample of 873 students from a population of 6749 students. The instruments for the study are the WAEC question paper containing 50 items with four options and the NECO question paper containing 60 items with five options. The statistical techniques used for data analysis were the independent t-test factorial analysis of variance and simple graphical presentation. Result of the findings showed that there was a significant difference between the difficulty level of test items both in item and person in WAEC and NECO examination instruments, with NECO having a more difficult level in their question paper. It was also found that there was no significant relationship between WAEC and NECO examination instruments and students ability parameter in mathematics.

Summary of Review of related Literature.

The review covered the concept of unidinensionality of tests, local independence of test items, test reliability and test equating. Item response theory which guided the studies was also reviewed. Item response theory models, application of item response theory, model-data fit and various methods of establishing the reliability of a test were also reviewed under theoretical studies. Some of the empirical studies related to the topic of the research were also reviewed. The current researcher investigated on equivalence of two examining bodies; WAEC and NECO in relation to test equating which were not done or well detailed in all other work reviewed. This is why the researcher therefore deemed it necessary to fill these gaps by embarking on the assessment of the equivalence of WAEC and NECO mathematics multiple – choice tests using item response theory.

CHAPTER THREE

METHOD

This chapter discussed the research procedures that were used in this study, namely, research design, area of the study, population of the study, sample and sampling techniques, instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection, method of data analysis.

Research Design

The design of the study was descriptive survey design. Descriptive survey studies are those studies which aim at collecting data on, and describing it in a systematic manner the characteristics, features or facts about a given population (Nworgu, 2015). This study sought ascertain the comparability or equivalence of WAEC and NECO mathematics multiple – choice tests using the psychometric criteria of test equitability in the framework of item response theory.

Area of the Study

The study was carried out in Imo State, Nigeria. The capital of the state is Owerri. The State has 27 local government areas, and 3 education zones namely Orlu (12 LGAs), Owerri (9 LGAs) and Okigwe (6 LGAs). The state is bounded in the East and North by Abia State, in the south by Rivers State, and in the West by Anambra State. The inhabitants of the state speak Igbo Language. The major occupations of the people are farming, trading, teaching and other professions such as engineering, medicine, accounting. The Majority of educated people in the state are in the civil /public service.

Population of the Study

The population of the study comprised all mathematics multiple–choice test items set by WAEC and NECO from 2000 to date. The population of the study also consisted of 37,036 senior secondary three (SS 3) students in the public secondary schools from the 3 education zones in the state that sat for the May/June 2015 Senior School Certificate Examination. There were 274 public Secondary schools in Imo State. The number of students in each local government area can be found in Appendix 3.

Sample and sampling Technique

The sample comprised 1051 SSIII students. In obtaining the sample, a combination of non-proportionate stratified random sampling and cluster sampling techniques was used. First the state was stratified into three, according to the education zones. In each of the education zones, 10 public secondary schools were obtained through simple random sampling. Thus gave rise to 30 secondary schools. All the year III senior secondary school (SS III) students in the 30 schools constituted the sample.

Instrument for data collection

The instrument of the study consisted of mathematics multiple-choice tests set by WAEC and NECO from 2011 to 2014. This consisted of 8 instruments for the 4 years of both examining bodies. The NECO Mathematics test was made up of 60 items. These items had five response options (A, B, C, D and E). The WAEC mathematics test was made up of 50 multiple–choice test items with 4 response options (A, B, C, and D).

Validation of Instrument

The validity of the tests was not obtained because these instruments were adopted. However, it should be pointed out that validity assessment was part of the parameters the study was designed to determine.

Reliability of the Instrument

The reliability of the tests was not obtained because these instruments were adopted. However, it should be pointed out that reliability assessments was part of the parameters the study was designed to determine.

Method of Data Collection

WAEC and NECO mathematics multiple – choice test items of 2011, 2012, 2013 and 2014 were administered to the testees, with the cooperation and support of the principals and mathematics teachers of the selected schools and

30 research assistants, under the supervision of the researcher. The pair of NECO 2011 and WAEC 2011 tests were separately administered within one week simultaneously in the 30 selected schools. The NECO 2012 and WAEC 2012, NECO 2013 and WAEC 2013 and NECO 2014 and WAEC 2014 tests were similarly administered at two weeks interval between each pair. In all, the administration of the four pairs of tests took a total of 10 weeks to be completed.

The administration of the mathematics tests in all the stages were carried out during the mathematics periods of the selected schools. However, in some cases, the administration extended into periods allocated to other subjects. Adherence to instructions as required by the examining bodies was strictly followed. Adequate supervision was provided to avoid cheating.

The exercises were carried out in the first term, to ensure that the sampled schools were covered before they sat for their exams. The duly completed mathematics multiple-choice items totalling 8408 were collected and marked. Each correct response attracted 1 mark, incorrect response attracted 0 mark.

Method of Data Analysis

Research question 1 was analyzed using factor analysis module of SPSS version 21. According to Lord (1980), when the eigenvalue of the first factor is substantially greater than the second then the data can be assumed to be approximately unidimensional.

Research questions 2 and 3 were analyzed using the tetrachoric correlation module of LISREL version 8.80 and frequency count. Assessment of item local independence is usually achieved by outright tetrachoric/polychoric correlation among items response on a test (Ubi, 2006 cited in Ubi, Joshua, & Umoinyang, 2011). According to Lord (1978) in Ubi et al (2011), an item is considered locally independent, if the tetrachoric/polychoric correlations among the items are not significantly different from zero.

Research question 4 was analyzed using Reduction in Uncertainty index (RiU). This index is expressed by the relation:

$$\text{RiU} = 1 - \sqrt{1 - r^2}$$

Where, r = correlation coefficient between the two sets of test scores.

Dorans (2000) stated that when the index of RiU estimated for two test scores is greater than 50%, it is concluded that the tests are close enough to measure the same ability. In order to achieve this feat, three stages of analysis of the data were advanced. They were; (1), calibration of examinees' ability scores (using BILOG MG), (2), correlation of examinees' ability scores on NECO and WAEC tests (using Pearson' moment correlation with SPSS version 21), and thereafter (3), estimation of RiU index.

When the need arise to estimate the ability estimates of examinees there are three models through which the item parameters and ability scores on multiple-choice test could be estimated: These are 1-PL, 2-PL, and 3-PL. In order to test whether or not it is reasonable to model the tests items of NECO and WAEC Mathematics tests according to the 1-, 2- or 3- parameter logistic model, the tests were subjected to the calibration module of BILOG MG using the 1PL, 2PL, and 3PL respectively.

When the 1-PL was used across the NECO Mathematics tests of years 2011, 2012, 2013, and 2014 it was observed that 30, 28, 23, and 19 items respectively were deleted by the model and for WAEC Mathematics tests it was observed that 25, 21, 26 and 24 items respectively were deleted by the model. When the 2-PL was used across the NECO Mathematics tests of years 2011, 2012, 2013, and 2014 it was observed that 23, 21, 19, and 16 items respectively were deleted by the model and for WAEC Mathematics tests it was observed that 21, 19, 20 and 19 items respectively were deleted.

When the 3-PL was used across the NECO Mathematics tests of years 2011, 2012, 2013, and 2014 it was observed that 11, 2, 8, and 2 items respectively were deleted by the model and for WAEC Mathematics tests it was observed that 1, nil, 2 and nil items respectively were deleted by the model. The implication of these results was that the 3-PL model was the most appropriate for the calibration of the tests items. Therefore the two tests were calibrated using the 3-PL model.

Research question 5 was analysed using empirical reliability of the calibration module of BILOG MG version 3.0. According to Cohen and Swerdlik (2009); Kline (2000) and Kline (2005), this value of reliability should not drop below 0.7.

Research question 6 was analysed using Linear equating transformation equations and scatter plots. According to Kolen and Brennan (2004; 2014), the functions are symmetrical when for example, an ability score of +2 on test 1 converts to ability score of +3 on test 2 scale, then an ability score of +3 on test 2 must convert to ability score of +2 on test 1 scale. The procedure is presented as follows: The ability scores of examinees in NECO were placed unto the same metric scale with the ability scores of examinees on WAEC test and the ability scores of the examinees on WAEC test were placed on the same metric scale with the ability scores on NECO Mathematics test using;

$x_N = \frac{\sigma_N}{\sigma_W} x_W + (\mu_N - \frac{\sigma_N}{\sigma_W} \mu_W)$ -------------eqn b and

$x_W = \frac{\sigma_W}{\sigma_N} x_N + \left(\mu_W - \frac{\sigma_W}{\sigma_N} \mu_N\right)$-------------eqn c respectively.

Where; x_N is the WAEC equivalent of an examinee's ability score on NECO mathematics test,

x_W is the NECO equivalent of an examinee's ability score WAEC Mathematics test,

μ_N is the mean of the ability scores of examinees on NECO test,

μ_W is the mean of the ability scores of examinees on WAEC Mathematics test,

σ_N is the standard deviation of the ability scores of examinees on NECO Mathematics test, and

σ_W is the standard deviation of the ability scores of examinees on WAEC Mathematics test,

Equation (b) presents the general equation for placing the ability scores on NECO Mathematics test unto the scale of ability scores of WAEC mathematics test and equation c presents the general equation for placing ability scores of WAEC Mathematics test unto the scale of ability scores of NECO mathematics test.

Hypothesis one was tested using Z-transformation of correlation coefficient statistics. The statistic is given by

$$Z = \sqrt[r]{\frac{N-2}{1-r^2}} \text{ (df = n-2)}$$

Where r is the correlation coefficient and N is the sample size.

In order to achieve this feat, the responses of examinees to the NECO and WAEC Mathematics multiple choice test were subjected to factor analysis respectively and their factor scores were obtained. Thereafter, the resulting factor scores were correlated to assess the equivalence of the unidimensionality of the tests (Gorsuch, 1983). Furthermore, the significance of the correlation coefficients was tested using Z-transformation.

Hypothesis two was tested at 0.05 level of significance using dependent alpha formula. According to Feldt, Woodruff & Salih (1987), it is expressed as

$$Z = \frac{(\alpha_1 - \alpha_2)(N-2)^{1/2}}{[4(1-\alpha_1)(1-\alpha_2)(1-P^2)]^{1/2}}$$ ----------- eqn 1

(DF = N – 2)

Where α_1 = reliability estimate of the first test

α_2 = reliability estimate of the second test,

P^2 = the squared Pearson's correlation coefficient between the total test scores obtained by examinees in the two tests and N is the sample size.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

This chapter presents the results of data analysis. The results are hereby presented in the order in which the research questions and hypotheses were stated.

Research question 1: To what extent are the SSCE mathematics multiple-choice test items of NECO and WAEC undimensional?

Table 5: Analysis of Total Variance Explained by Major Components of 2011 NECO Mathematics Test

Component	Initial Eigenvalue			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.978	11.630	11.630	6.978	11.630	11.630
2	3.003	5.005	16.635			
3	2.394	3.990	20.624			
4	2.153	3.588	24.213			
5	1.907	3.178	27.391			
6	1.840	3.067	30.458			
7	1.683	2.804	33.262			
8	1.595	2.658	35.920			
9	1.557	2.595	38.515			
+	+	+	+			
+	+	+	+			
51	.439	.732	94.490			
52	.429	.715	95.205			
53	.420	.699	95.905			
54	.403	.671	96.576			
55	.395	.659	97.235			
56	.372	.619	97.854			
57	.368	.613	98.467			
58	.337	.562	99.029			
59	.297	.495	99.524			
60	.285	.476	100.000			

From the table, the highest eigenvalue is 6.98 and is for component 1 and it explains 11.6% of the variance. Component 2 has 3.00 which accounts for 5.0% of the variance. The ratio of the eigenvalue of the first component to the second component is 2.33 to 1 (2.33:1). Thus the test is unidimensional

Table 6: Analysis of Total Variance Explained by the Major Components of 2012 NECO Mathematics Test

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.355	18.925	18.925	11.355	18.925	18.925
2	3.155	5.259	24.183			
3	2.649	4.415	28.598			
4	2.452	4.086	32.684			
5	2.091	3.485	36.170			
6	1.847	3.078	39.248			
7	1.659	2.765	42.013			
8	1.457	2.429	44.441			
9	1.413	2.354	46.796			
+	+	+	+			
+	+	+	+			
48	.397	.662	93.585			
49	.381	.635	94.220			
50	.365	.608	94.829			
51	.363	.604	95.433			
52	.349	.582	96.015			
53	.345	.575	96.590			
54	.325	.542	97.132			
55	.322	.536	97.668			
56	.310	.516	98.184			
57	.302	.504	98.688			
58	.275	.459	99.147			
59	.272	.454	99.600			
60	.240	.400	100.000			

From Table 6, the highest eigenvalue is 11.36 and is for component 1. This eigenvalue explains 18.9% of the variance. The second component has an eigenvalue of 3.26 which explains 5.5% of the variance. The ratio of the eigenvalue of the first component to the second component is 3.5 to 1 (3.5 : 1). The test therefore is unidimensional

Table 7: Analysis of Total Variance Explained by the Major Components of 2013 NECO Mathematics Test

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.093	10.650	10.650	6.093	10.155	10.155
2	3.007	5.000	15.650			
3	2.686	4.476	20.126			
4	2.255	3.758	23.884			
5	1.896	3.160	27.044			
6	1.793	2.988	30.032			
7	1.685	2.809	32.840			
8	1.639	2.732	35.572			
9	1.551	2.584	38.156			
+	+	+	+			
+	+	+	+			
44	.530	.883	88.953			
45	.524	.873	89.826			
46	.500	.833	90.659			
47	.497	.828	91.486			
48	.476	.794	92.280			
49	.472	.787	93.067			
50	.456	.761	93.827			
51	.430	.717	94.545			
52	.422	.704	95.249			
53	.409	.682	95.930			
54	.406	.677	96.607			
55	.391	.651	97.259			
56	.366	.611	97.869			
57	.355	.592	98.461			
58	.330	.550	99.011			
59	.321	.534	99.545			
60	.273	.455	100.000			

From Table 7, the highest eigenvalue is 6.09 and is for component 1. This eigenvalue explains 10.65 % of the variance. The second component has an eigenvalue of 3.01 which explains 5.0 % of the variance. The ratio of the eigenvalue of the first component to the second component is 2.0 to 1 (2.0 : 1). Thus the test is unidimensional.

Table 8: Analysis of Total Variance Explained by the Major Components of 2014 NECO Mathematics Test

Component	Initial Eigenvalue			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.452	22.420	22.420	13.452	22.420	22.420
2	3.914	6.524	28.944			
3	3.136	5.226	34.170			
4	2.568	4.281	38.451			
5	2.083	3.472	41.923			
6	1.968	3.280	45.202			
7	1.547	2.578	47.781			
8	1.484	2.474	50.255			
9	1.290	2.151	52.405			
+	+	+	+			
+	+	+	+			
44	.375	.624	92.064			
45	.367	.612	92.677			
46	.362	.603	93.280			
47	.353	.588	93.868			
48	.342	.571	94.438			
49	.340	.567	95.005			
50	.327	.545	95.550			
51	.319	.532	96.082			
52	.306	.510	96.592			
53	.293	.488	97.080			
54	.281	.468	97.548			
55	.274	.456	98.004			
56	.267	.444	98.448			
57	.252	.420	98.868			
58	.242	.403	99.272			
59	.220	.367	99.639			
60	.217	.361	100.000			

From Table 8, the highest eigenvalue is 13.45 and is for component 1. This eigenvalue explains 22.42 % of the variance. The second component has an eigenvalue of 3.91 which explains 6.52 % of the variance. The ratio of the eigenvalue of the first component to the second component is 3.4 to 1 (3.4 : 1). The test is therefore unidimensional

Table 9: Analysis of Total Variance Explained by the Major Components of 2011 WAEC Mathematics Test

Component	Initial Eigenvalue			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.914	23.828	23.828	11.914	23.828	23.828
2	2.651	5.302	29.131			
3	2.345	4.691	33.822			
4	1.975	3.950	37.771			
5	1.638	3.276	41.047			
6	1.503	3.006	44.054			
7	1.414	2.828	46.882			
8	1.376	2.752	49.634			
9	1.272	2.543	52.177			
+	+	+	+			
+	+	+	+			
35	.448	.896	89.434			
36	.446	.893	90.327			
37	.422	.844	91.171			
38	.416	.831	92.002			
39	.408	.816	92.819			
40	.389	.779	93.598			
41	.375	.749	94.347			
42	.354	.709	95.056			
43	.347	.695	95.750			
44	.338	.676	96.426			
45	.321	.641	97.068			
46	.317	.633	97.701			
47	.308	.616	98.317			
48	.293	.585	98.902			
49	.279	.559	99.461			
50	.269	.539	100.000			

From Table 9, the highest eigenvalue is 11.91 and is for component 1. This eigenvalue explains 23.8 % of the variance. The second component has an eigenvalue of 2.65 which explains 5.3% of the variance. The ratio of the eigenvalue of the first component to the second component is 4.5 to 1(4.5: 1). Thus the test is unidimensional.

Table 10: Analysis of Total Variance Explained by the Major Components of 2012 WAEC Mathematics test

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.307	20.615	20.615	10.307	20.615	20.615
2	2.981	5.962	26.577			
3	2.706	5.413	31.990			
4	2.291	4.582	36.572			
5	1.993	3.985	40.557			
6	1.655	3.311	43.868			
7	1.393	2.785	46.653			
8	1.327	2.654	49.307			
9	1.212	2.424	51.731			
+	+	+	+			
+	+	+	+			
35	.475	.951	89.212			
36	.440	.880	90.092			
37	.438	.875	90.967			
38	.424	.848	91.816			
39	.408	.816	92.632			
40	.404	.808	93.439			
41	.388	.775	94.215			
42	.364	.729	94.944			
43	.363	.727	95.671			
44	.351	.702	96.373			
45	.327	.654	97.026			
46	.318	.637	97.663			
47	.308	.615	98.278			
48	.306	.612	98.891			
49	.294	.588	99.479			
50	.261	.521	100.000			

From Table 10, the highest eigenvalue is 10.31 and is for component 1. This eigenvalue explains 20.6 % of the variance. The second component has an eigenvalue of 2.98 which explains about 6.0% of the variance. The ratio of the eigenvalue of the first component to the second component is 3.5 to 1 (3.5 : 1). The test is therefore unidimensional.

Table 11: Analysis of Total Variance Explained by the Major Components of 2013 WAEC Mathematics Test

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.289	20.577	20.577	10.289	20.577	20.577
2	3.125	6.249	26.827			
3	2.816	5.632	32.459			
4	2.327	4.654	37.112			
5	1.843	3.686	40.798			
6	1.451	2.901	43.700			
7	1.351	2.702	46.402			
8	1.303	2.606	49.007			
9	1.242	2.484	51.492			
+	+	+	+			
+	+	+	+			
34	.471	.943	88.403			
35	.454	.908	89.311			
36	.453	.906	90.216			
37	.429	.859	91.075			
38	.421	.842	91.916			
39	.401	.802	92.719			
40	.385	.771	93.489			
41	.382	.765	94.254			
42	.367	.734	94.988			
43	.365	.729	95.718			
44	.341	.683	96.400			
45	.337	.675	97.075			
46	.328	.657	97.732			
47	.316	.631	98.363			
48	.287	.574	98.937			
49	.268	.536	99.473			
50	.264	.527	100.000			

From Table 11, the highest eigenvalue is 10.24 and is for component 1. This eigenvalue explains 20.6 % of the variance. The second component has an eigenvalue of 3.13 which explains 6.3 % of the variance. The ratio of the eigenvalue of the first component to the second component is 3.3 to 1 (3.5 : 1). The test is therefore unidimensional.

Table 12: analysis of total variance explained by the major components of 2014 WAEC mathematics test

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.415	20.830	20.830	10.415	20.830	20.830
2	2.911	5.821	26.652			
3	2.532	5.065	31.717			
4	1.981	3.962	35.678			
5	1.812	3.623	39.302			
6	1.609	3.218	42.519			
7	1.550	3.100	45.619			
8	1.407	2.814	48.433			
9	1.389	2.778	51.211			
+	+	+	+			
+	+	+	+			
34	.465	.929	88.900			
35	.450	.901	89.800			
36	.429	.859	90.659			
37	.416	.832	91.491			
38	.413	.825	92.316			
39	.403	.806	93.122			
40	.381	.762	93.885			
41	.377	.754	94.639			
42	.354	.708	95.346			
43	.342	.683	96.029			
44	.324	.649	96.678			
45	.316	.632	97.310			
46	.304	.609	97.918			
47	.284	.567	98.486			
48	.269	.537	99.023			
49	.255	.510	99.533			
50	.233	.467	100.000			

From Table 12, the highest eigenvalue is 10.42 and is for component 1. This eigenvalue explains 20.8 % of the variance. The second component has an eigenvalue of 2.91 which explains 5.8 % of the variance. The ratio of the eigenvalue of the first component to the second component is 3.6 to 1 (3.6 : 1). Thus the test is unidimensional.

Research question 2: How locally independent are SSCE mathematics multiple choice test items of NECO and WAEC?

To answer this research question, tetrachoric correlation analysis was conducted using LISREL Version 8.8. Table 14 through table 21 presents statistics of the tetrachoric correlations (abridged, see appendix 6 for complete version) among the NECO and WAEC tests items.

Table 13: Inter-correlation Matrix of the Tetrachoric Correlation among 2011 NECO Mathematics Test Items

Items	1	2	3	4	5	+	56	57	58	59	60
1	1.000										
2	0.604	1.000									
3	-0.221	-0.637	1.000								
4	0.140	0.625	-0.574	1.000							
5	0.366	0.705	-0.608	0.700	1.000						
+						+					
56	0.155	-0.061	-0.135	0.024	0.099		1.000				
57	-0.334	-0.253	0.449	-0.119	-0.128		-0.403	1.000			
58	0.311	0.002	-0.109	-0.233	-0.247		-0.046	-0.301	1.000		
59	0.077	0.162	-0.380	0.139	0.159		0.099	-0.451	0.104	1.000	
60	-0.404	0.559	0.518	-0.337	-0.449		0.001	0.456	-0.279	-0.073	1.000

Table 13 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 60 items of 2011 NECO mathematics test.

Table 14: Summary of Tetrachoric Correlation Coefficients Among the 60-Item 2011 NECO Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 - 0.399	0.400 -0.499	≥ 0.500	Total count
1-60	41	7	5	4	3	2	59
2-60	37	6	6	4	5	4	58
3-60	39	2	3	4	4	3	57
+	+	+	+	+	+	+	+
57-60	2	-	-	-	1	-	3
58-60	1	1	-	-	-	-	2
59-60	1	-	-	-	-	-	1
Total	1252 70.7%	195 11.0%	134 7.6%	102 5.8%	47 2.7%	32 1.8%	1770 100%

The result shows that for item 1, for example, there were 59 correlation coefficients in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 60. Among the 59 correlation coefficients, 41 have values that are less than or equal to 0.099; 7 have values that fall within 0.100 to 0.199, and 5 have values within 0.200 to 0.299; 3 have values within 0.400 to 0.499; and 2 have values greater than or equal to 0.500. The table also presents the tetrachoric correlations between item 2 and items 3, 4, 5 …60 (giving 58 correlation coefficients). The table entire table therefore presents the correlation between each of the 60 items and the other remaining items. This gives 1770 correlation coefficients on the whole.

Out of the 1770 correlations among the 60 items, 1252 (representing 70.7%) have tetrachoric correlation coefficients equal to or less than 0.099; 195 (representing 11.0%) have tetrachoric correlation coefficients within the range

0.100 to 0.199; 134 (representing about 7.6%) have tetrachoric correlation coefficients within the range 0.200to 0.299; 102 (representing 5.8%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 47 (representing 2.7%) have correlation coefficients within the range 0.400 to 0.499; and 32 (representing 1.8%) have correlation coefficient greater than or equal to 0.500. In all the larger percentage (about 90%) of the observed tetrachoric correlation coefficients, among the 60-item NECO Mathematics test of year 2011 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2011 NECO test are locally independent.

Table 15: Inter-correlation Matrix of the Tetrachoric Correlation among 2012 NECO Mathematics Test Items

Items	1	2	3	4	5	+	56	57	58	59	60
1	1.000										
2	0.604	1.000									
3	0.688	0.677	1.000								
4	0.584	0.481	0.527	1.000							
5	0.584	0.558	0.768	0.632	1.000						
+						+					
56	0.427	0.418	0.306	0.183	0.236		1.000				
57	0.499	0.376	0.271	0.264	0.207		0.775	1.000			
58	0.618	0.439	0.419	0.355	0.384		0.656	0.752	1.000		
59	0.540	0.339	0.273	0.390	0.275		0.469	0.564	0.535	1.000	
60	0.466	0.429	0.312	0.231	0.384		0.508	0.573	0.670	0.532	1.000

Table 15 presents the summary of frequencies of the observed polychoric/tetrachoric correlation coefficients among the 60 items of 2012 NECO mathematics test.

Table 16: Summary of Tetrachoric Correlation Coefficients among the 60-Item 2012 NECO mathematics test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 - 0.399	0.400 -0.499	≥ 0.500	Total count
1-60	4	4	10	13	14	14	59
2-60	11	10	13	13	8	3	58
3-60	8	6	16	15	8	4	57
+	+	+	+	+	+	+	+
56-60	-	-	-	-	1	3	4
57-60	-	-	-	-	-	3	3
58-60	-	-	-	-	-	2	2
59-60	-	-	-	-	-	1	1
Total	330 18.6%	290 16.4%	410 23.16%	401 22.7%	211 11.9%	128 7.2%	1770 100%

The result shows that for item1, For example, there were 59 correlation coefficients in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 60. Among the 59 correlation coefficients, 4 have values that are less than or equal to 0.099; 4 have values within 0.100 to 0.199, 10 have values within 0.200 to 0.299; 13 have values within 0.300 to 0.399; 14 have values within 0.400 to 0.499; and 14 have values greater than or equal to 0.500. Similarly the table also presents the correlations between item 2 and each of the other subsequent items, giving rise to 58 correlation coefficients. On the whole therefore, the table presents the correlation coefficients between each of the 60 items and all the other remaining items. This gave rise to 1770 correlation coefficients.

Out of the 1770 correlations among the 60 items, 330 (representing 18.6%) have tetrachoric correlation coefficients equal to or less than 0.099; 290 (representing 16.4%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 410 (representing about 23.2%) have tetrachoric correlation coefficients within the range 0.200to 0.299; 401 (representing 22.7%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 211 (representing 11.9%) have correlation coefficients within the range 0.400 to 0.499; and 128(representing 1.8%) have correlation coefficients greater than or equal to 0.500. In all a larger percentage (about 58.2 %) of the observed tetrachoric correlation coefficients, among the 60-item NECO Mathematics test of year 2012 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore, the items for 2012 NECO test are locally independent.

Table 17: Inter-correlation Matrix of the Tetrachoric Correlation among 2013 NECO Mathematics Test Items

Items	1	2	3	4	5	+	56	57	58	59	60
1	1.000										
2	0.105	1.000									
3	-0.515	-0.097	1.000								
4	0.060	0.461	-0.312	1.000							
5	0.076	0.226	-0.335	0.614	1.000						
+	+	+	+	+	+	+					
56	-0.260	0.157	0.060	-0.067	0.119		1.000				
57	0.133	-0.163	0.112	-0.018	-0.168		0.053	1.000			
58	0.544	0.213	-0.278	0.076	-0.080		0.169	0.034	1.000		
59	0.094	0.054	-0.118	0.336	0.171		0.081	-0.362	0.065	1.000	
60	-0.026	-0.118	0.289	0.029	0.194		-0.185	0.474	-0.169	-0.224	1.000

Table 17 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 60 items of 2013 NECO mathematics test.

Table 18: Summary of Tetrachoric Correlation Coefficients among the 60-Item 2013 NECO Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 - 0.399	0.400 -0.499	≥ 0.500	Total count
1-60	39	8	2	2	1	7	59
2-60	34	13	10	-	1	-	58
3-60	40	2	9	3	3	-	57
+	+	+	+	+	+	+	+
56-60	3	1	-	-	-	-	4
57-60	2	-	-	-	1	-	3
58-60	2	-	-	-	-	-	2
59-60	1	-	-	-	-	-	1
Total	1188	237	159	102	57	27	1770
	67.1%	13.4%	9.0%	5.8%	3.2%	1.5%	100%

The result shows that for item1, For example, for item 1, there were 59 correlation coefficients, in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 60. Among the 59 correlation coefficients, 39 have values that are less than or equal to 0.099; 8 have values within 0.100 to 0.199, and 2 have values within 0.200 to 0.299; 2 have values within 0.300 to 0.399; and 1 have values within 0.400 to 0.499; and 7 have values greater than or equal to 0.500. Similarly, the table presents the correlations between item 2 and the other subsequent items, giving rise to 58 correlation coefficients. On the whole therefore, the table presents the correlation coefficients between each of the 60 items and all the other remaining items. This gave rise to 1770 correlation coefficients.

Out of the 1770 correlations among the 60 items, 1188 (representing 67.1%) have tetrachoric correlation coefficients equal to or less than 0.099; 237 (representing 13.4%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 159 (representing about 9.0%) have tetrachoric correlation coefficients within the range 0.200 to 0.299; 102 (representing 5.8%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 57 (representing 3.2%) have correlation coefficients within the range 0.400 to 0.499; and 27(representing 1.5%) have correlation coefficient greater than or equal to 0.500. In all, about 90 % of the observed tetrachoric correlation coefficients, among the 60-item NECO Mathematics test of year 2013 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2013 NECO test are locally independent.

Table 19: Inter-correlation Matrix of the Tetrachoric Correlation among 2014 NECO Mathematics Test Items

Items	1	2	3	4	5	+	56	57	58	59	60
1	1.000										
2	0.710	1.000									
3	0.491	0.731	1.000								
4	0.582	0.710	0.593	1.000							
5	0.555	0.692	0.563	0.792	1.000						
+	+	+	+	+	+	+					
56	0.311	0.380	0.218	0.343	0.339		1.000				
57	0.116	0.260	0.159	0.365	0.373		0.446	1.000			
58	-0.453	-0.388	-0.520	-0.396	0.302		-0.340	0.177	1.000		
59	0.726	0.703	0.506	0.626	0.559		0.538	0.500	-0.726	1.000	
60	0.752	0.708	0.415	0.522	0.547		0.351	0.255	-0.532	0.795	1.000

Table 19 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 60 items of 2014 NECO mathematics test.

Table 20: Summary of Tetrachoric Correlation Coefficients among the 60-Item 2014 NECO Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 -0.399	0.400 -0.499	≥ 0.500	Total count
1-60	8	5	23	7	16	-	59
2-60	4	2	26	7	9	10	58
3-60	7	9	4	17	11	9	57
+	+	+	+	+	+	+	+
56-60	1	-	-	1	1	1	4
57-60	-	1	1	-	-	1	3
58-60	2	-	-	-	-	-	2
59-60	-	-	-	-	-	1	1
Total	295 16.7%	253 14.3%	404 22.8%	348 19.7%	263 14.0%	207 11.7%	1770 100%

The result shows that for item1, For example, there were 59 correlation coefficients, in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 60. Among the 59 correlation coefficients, 8 have values that are less than or equal to 0.099; have values within 0.100 to 0.199, and 5 have values within 0.200 to 0.299; 23 have values within 0.300 to 0.399; and 16 have values within 0.400 to 0.499. The table also presents the tetrachoric correlations between item 2 and items 3, 4, 5 …60 (giving 58 correlation coefficients). Similarly, the table presents the correlations between item 2 and the other subsequent items, giving rise to 58 correlation coefficients. On the whole therefore, the table presents the correlation coefficients between each of the 60 items and all the other remaining items. This gave rise to 1770 correlation coefficients.

Out of the 1770 correlations among the 60 items, 295 (representing 16.7%) have tetrachoric correlation coefficients equal to or less than 0.099; 253 (representing 14.3%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 404 (representing about 22.8%) have tetrachoric correlation coefficient within the range 0.200 to 0.299; 348 (representing 19.7%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 263 (representing 14.0%) have correlation coefficients within the range 0.400 to 0.499; and 207(representing 11.7%) have correlation coefficients greater than or equal to 0.500. In all a larger percentage (about 54 %) of the observed tetrachoric correlation coefficients, among the 60-item NECO Mathematics test of year 2014 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2014 NECO test are locally independent.

Table 21: Inter-correlation Matrix of the Tetrachoric Correlation among 2011 WAEC Mathematics Test Items

Items	1	2	3	4	5	+	46	47	48	49	50
1	1.000										
2	0.645	1.000									
3	0.638	0.655	1.000								
4	0.597	0.713	0.596	1.000							
5	0.293	0.444	0.482	0.561	1.000						
+	+	+	+	+	+	+					
46	0.425	0.410	0.486	0.502	0.438		1.000				
47	0.311	0.358	0.486	0.514	0.580		0.723	1.000			
48	0.468	0.611	0.477	0.593	0.407		0.522	0.671	1.000		
49	0.468	0.242	0.408	0.333	0.165		0.318	0.359	0.194	1.000	
50	0.371	0.365	0.344	0.346	0.525		0.514	0.530	0.397	0.423	1.000

Table 21 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 50 items of 2011 WAEC mathematics test.

Table 22: Summary of Tetrachoric Correlation Coefficients among the 60-Item 2011 WAEC Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 - 0.399	0.400 -0.499	≥ 0.500	Total count
1-50	5	8	18	1	13	4	49
2-50	1	6	21	-	12	8	48
3-50	2	4	19	-	17	5	47
+	+	+	+	+	+	+	+
47-50	-	-	-	1	-	2	3
48-50	-	1	-	1	-	-	2
49-50	-	-	-	-	1	-	1
Total	108	170	447	108	240	152	1225
	8.8%	13.9%	36.5%	8.8%	19.6%	12.4%	100%

The result shows that for item1, For example, there were 49 correlation coefficients in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 50. Among the 49 correlation coefficients, 5 have values that are less than or equal to 0.099; 8 have values within 0.100 to 0.199, 18 have values within 0.200 to 0.299; 1 have value within 0.300 to 0.399; 13 have values within 0.400 to 0.499; and 4 have values greater than or equal to 0.500 tetrachoric correlations between item 2 and items 3, 4, 5 …60 (giving 48 correlation coefficients). The entire table therefore presents the correlation between each of the 50 items and the other remaining items. This gives rise to 1225 correlation coefficients on the whole.

Out of the 1225 correlations among the 50 items, 108 (representing 8.8%) have tetrachoric correlation coefficients equal to or less than 0.099; 170 (representing 13.9%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 447 (representing about 36.5%) have tetrachoric correlation coefficients within the range 0.200 to 0.299; 108 (representing 8.8%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 240 (representing 19.6%) have correlation coefficients within the range 0.400 to 0.499; and 152(representing 12.4%) have correlation coefficients greater than or equal to 0.500. In all, about 60 % of the observed tetrachoric correlation coefficients, among the 50-item WAEC Mathematics test for year 2011 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2011 WAEC test are locally independent.

Table 23: Inter-correlation Matrix of the Tetrachoric Correlation among 2012 WAEC Mathematics Test Items

Items	1	2	3	4	5	+	46	47	48	49	50
1	1.000										
2	0.610	1.000									
3	0.410	0.556	1.000								
4	0.421	0.566	0.802	1.000							
5	0.111	0.322	0.614	0.435	1.000						
+	+	+	+	+	+	+					
46	0.333	0.292	0.351	0.300	-0.016		1.000				
47	0.308	0.300	0.524	0.510	0.191		0.557	1.000			
48	0.544	0.540	0.407	0.407	0.095		0.626	0.595	1.000		
49	0.342	0.500	0.552	0.496	0.392		0.488	0.635	0.554	1.000	
50	0.398	0.469	0.575	0.508	0.391		0.411	0.636	0.492	0.699	1.000

Table 23 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 50 items of 2012 WAEC mathematics test.

Table 24: Summary of Tetrachoric Correlation Coefficients among the 50-Item 2012WAEC Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 - 0.399	0.400 -0.499	≥ 0.500	Total count
1-50	4	10	20	6	6	3	49
2-50	-	3	20	15	5	5	48
3-50	-	2	9	14	16	6	47
+	+	+	+	+	+	+	+
46-50	-	-	-	-	2	2	4
47-50	-	-	-	-	-	3	3
48-50	-	-	-	-	1	1	2
49-50	-	-	-	-	-	1	1
Total	94	192	347	302	174	110	1225
	7.7%	15.7%	28.6%	24.4%	14.5%	9.0%	100%

The result shows that for item1, for example, there were 49 correlation coefficients, in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 50. Among the 49 correlation coefficients, 4 have values that are less than or equal to 0.099; 10 have values within 0.100 to 0.199, 20 have values within 0.200 to 0.299; 6 have values within 0.300 to 0.399; 6 have values within 0.400 to 0.499; and 3 have values greater than or equal to 0.500. Similarly the table also presents the correlations between item 2 and each of the other subsequent items, giving rise to 48 correlation coefficients. On the Whole therefore, the table presents the correlation coefficients between each of the 50 items and all the other remaining items. This gave rise to 1225 correlation coefficients

Out of the 1225 correlations among the 50 items, 94 (representing 7.7%) have tetrachoric correlation coefficients equal to or less than 0.099; 192 (representing 15.7%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 347 (representing about 28.6%) have tetrachoric correlation coefficients within the range 0.200to 0.299; 302 (representing 24.4%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 174 (representing 14.5%) have correlation coefficients within the range 0.400 to 0.499; and 110(representing 9.0%) have correlation coefficients greater than or equal to 0.500. In all a large percentage (52 %) of the observed tetrachoric correlation coefficients, among the 50-item WAEC Mathematics test of year 2012 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2012 WAEC test are locally independent.

Table 25: Inter-correlation Matrix of the Tetrachoric Correlation among 2013 WAEC Mathematics Test Items

Items	1	2	3	4	5	+	46	47	48	49	50
1	1.000										
2	0.723	1.000									
3	0.697	0.718	1.000								
4	0.724	0.603	0.499	1.000							
5	0.711	0.436	0.477	0.545	1.000						
+	+	+	+	+	+	+					
46	0.312	0.451	0.362	0.307	0.117		1.000				
47	0.162	0.426	0.339	0.219	0.193		0.509	1.000			
48	0.310	0.518	0.417	0.342	0.252		0.631	0.369	1.000		
49	0.512	0.694	0.587	0.405	0.282		0.531	0.480	0.712	1.000	
50	0.490	0.389	0.288	0.390	0.314		0.357	0.271	0.247	0.467	1.000

Table 25 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 50 items of 2013 WAEC mathematics test.

Table 26: Summary of Tetrachoric Correlation Coefficients among the 50-Item 2013 WAEC Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 - 0.399	0.400 -0.499	≥ 0.500	Total count
1-50	5	3	9	14	6	12	49
2-50	4	1	10	7	16	10	48
3-50	4	2	9	8	16	8	47
+	+	+	+	+	+	+	+
46-50	-	-	-	1		3	4
47-50	-	-	1	1	1	-	3
48-50	-	-	1	-	-	1	2
49-50	-	-	-	-	1	-	1
Total	242 19.8%	187 15.3%	279 22.8%	246 20.0%	157 12.8%	114 9.3%	1225 100%

The result shows that for item1, For example, there were 49 correlation coefficients in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 50. Among the 49 correlation coefficients, 5 have values that are less than or equal to 0.099; 3 have values within 0.100 to 0.199, 9 have values within 0.200 to 0.299; 14 have values within 0.300 to 0.399; 6 have values within 0.400 to 0.499; and 12 have values greater than or equal to 0.500. Similarly, the table presents the correlations between item 2 and each of the other subsequent items, giving rise to 48 correlation coefficients. On the whole therefore, the table presents the correlation coefficients between each of the 50 items and all the other remaining items. This gave rise to 1225 correlation coefficients.

Out of the 1225 correlations among the 50 items, 242 (representing 19.8%) have tetrachoric correlation coefficients equal to or less than 0.099; 187 (representing 15.3%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 279 (representing about 22.8%) have tetrachoric correlation coefficients within the range 0.200 to 0.299; 246 (representing 20.0%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 157 (representing 12.8%) have correlation coefficients within the range 0.400 to 0.499; and 114(representing 9.3%) have correlation coefficients greater than or equal to 0.500. In all a larger percentage (about 58 %) of the observed tetrachoric correlation coefficients, among the 50-item WAEC Mathematics test of year 2013 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2013 WAEC are locally independent.

Table 27: Inter-correlation Matrix of the Tetrachoric Correlation among 2014 WAEC Mathematics Test Items

Items	1	2	3	4	5	+	46	47	48	49	50
1	1.000										
2	0.476	1.000									
3	0.303	0.712	1.000								
4	0.375	0.675	0.477	1.000							
5	0.382	0.687	0.586	0.682	1.000						
+						+					
46	0.186	0.253	0.321	0.186	0.203		1.000				
47	0.185	0.267	0.327	0.306	0.260		0.381	1.000			
48	0.187	0.257	0.371	0.232	0.070		0.370	0.302	1.000		
49	0.335	0.555	0.474	0.460	0.449		0.557	0.467	0.324	1.000	
50	0.265	0.387	0.541	0.225	0.246		0.471	0.437	0.491	0.542	1.000

Table 27 presents the summary of frequencies of the observed tetrachoric correlation coefficients among the 50 items of 2014 WAEC mathematics test.

Table 28: Summary of Tetrachoric Correlation Coefficients among the 50-Item 2014 WAEC Mathematics Test

Item	≤ 0.099	0.100-0.199	0.200-0.299	0.300 -0.399	0.400 -0.499	≥ 0.500	Total count
1-50	3	14	14	12	6	-	49
2-50	3	7	12	9	8	9	48
3-50	-	3	11	9	14	10	47
+	+	+	+	+	+	+	+
47-50	-	-	-	1	2	-	3
48-50	-	-	-	1	1	-	2
49-50	-	-	-	-	-	1	1
Total	202	215	271	249	176	112	1225
	16.5%	17.6%	22.1%	20.3%	14.4%	9.1%	100

The result shows that for item1, for example there were 49 correlation coefficients, in that it correlates with item 2, item 3, item 4, item 5, and so on up to item 50. Among the 49 correlation coefficients, 3 have values that are less than or equal to 0.099; 14 have values within 0.100 to 0.199, 14 have values within 0.200 to 0.299; 12 have values within 0.300 to 0.399; 6 have values within 0.400 to 0.499; and none fall within values greater than or equal to 0.500. Similarly, the table presents the correlations between item 2 and each of the other subsequent items, giving rise to 48 correlation coefficients. On the whole therefore, the table presents the correlation coefficients between each of the 50 items and all the other remaining items. This gave rise to 1225 correlation coefficients.

Out of the 1225 correlations among the 50 items, 202 (representing 16.5%) have tetrachoric correlation coefficients equal to or less than 0.099; 215

(representing 17.6%) have tetrachoric correlation coefficients within the range 0.100 to 0.199; 271 (representing about 22.1%) have tetrachoric correlation coefficients within the range 0.200 to 0.299; 219 (representing 20.3%) have tetrachoric correlation coefficients within the range 0.300 to 0.399; 176 (representing 14.4%) have correlation coefficients within the range 0.400 to 0.499; and 112(representing 9.1%) have correlation coefficients greater than or equal to 0.500. In all a larger percentage (about 56%) of the observed tetrachoric correlation coefficients, among the 50-item WAEC Mathematics test of year 2013 are less than or equal to 0.299 which is the minimum yardstick for determining level of local independence of test items. Therefore the items for 2013 WAEC test are locally independent.

Research question 3: How equivalent are the local independence of SSCE mathematics multiple choice test items of NECO and WAEC?

In order to answer this research question, the summary of the tetrachoric correlation coefficients among NECO and WAEC tests items' that fall within the ranges of ≤ 0.299 and ≥ 0.300 reported in Table 15 through 29) were compared. Table 30 presents the distribution of the correlation coefficients of pairs of the NECO and WAEC items' falling within ranges ≤ 0.299 and ≥ 0.300.

Table 29: Distribution of the correlation coefficients of pairs of the NECO and WAEC items' falling within ranges ≤ 0.299 and ≥ 0.300

		Correlation Coefficient		
Year	Test	≤ 0.299	≥ 0.300	Total count
2011	NECO	1581 (89.3%)	189 (10.7%)	1770 (100%)
	WAEC	725 (59.2%)	500 (40.8%)	1225 (100%)
2012	NECO	1030 (58.2%)	740 (41.8%)	1770 (100%)
	WAEC	633 (51.7%)	592 (48.3%)	1225 (100%)
2013	NECO	1584 (89.5%)	186 (10.5%)	1770 (100%)
	WAEC	708 (57.8%)	517 (42.2%)	1225 (100%)
2014	NECO	1005 (53.8%)	765 (47.2%)	1770 (100%)
	WAEC	688 (56.2%)	537 (43.8%)	1225(100%)

Table 29 shows that in 2011, 89.3% of item inter-correlation coefficients for NECO had values equal to or less than 0.299, while for WAEC it was 59.2%. This shows that in 2011, the NECO items were more locally independent than those of WAEC. In 2012, 58.2% of item inter-correlation coefficients for NECO had values equal to or less than 0.299, while for WAEC it was 51.7%. This shows that in 2012, the NECO items were more locally independent than those of WAEC. In 2013, 89.5% of item inter-correlation coefficients for NECO had values equal to or less than 0.299, while for WAEC it was 57.8%. This shows that in 2013, the NECO items were more locally independent than those of WAEC. Finally in 2014, 53.8% of item inter-correlation coefficients for NECO had values equal to or less than 0.299, while for WAEC it was 56.2%. This shows that in 2014, the WAEC items were more locally independent than those of NECO.

Research question 4: To what extent do SSCE mathematics multiple choice tests of NECO and WAEC measure the same ability (i.e., mathematics proficiency)?

The results are presented as follows:

Stage one, ability score estimation

Table 30: Examinees' Ability scores, Mean and Standard Deviationon of NECO and WAEC

	2011		2012		2013		2014	
S/N	NECO	WAEC	NECO	WAEC	NECO	WAEC	NECO	WAEC
1	0.66	-0.46	0.43	0.9	0.59	0.46	0.91	0.43
2	0.89	-0.93	0.58	1.08	0.64	0.43	1.1	1.68
3	-0.41	0.27	0.94	0.59	0.56	0.62	0.5	1.29
4	0.38	0.31	0.38	0.81	0.91	0.42	0.86	1.16
5	0.28	0.22	0.77	-0.09	0.76	0.06	0.87	0.39
6	0.38	-0.03	0.65	0.91	0.97	0.63	-1.56	-0.01
7	0.99	0.32	0.63	0.91	0.6	0.35	1.16	1.01
8	0.62	0.7	0.75	1.05	0.45	0.58	1.47	1.54
9	-0.13	0.31	0.46	-0.39	-1.25	0.68	0.89	0.99
+	+	+	+	+	+	+	+	+
+	+	+	+	+	+	+	+	+
1042	-1.05	-0.66	0.29	0.75	-1.82	-1.26	-0.13	-0.05
1043	-1.32	-0.93	-0.5	0.54	-0.75	-0.19	-0.54	-1.25
1044	-0.3	-0.49	0.19	-0.18	-0.15	-1.32	-0.02	-1.3
1045	-0.85	-0.85	-0.1	0.7	-0.42	-1.17	0.15	-1.4
1046	-0.36	-1.2	0.24	1.31	-0.54	-1.02	-0.34	-0.79
1047	-0.27	-0.1	-0.23	0.25	-0.32	-1.26	-0.16	-2.08
1048	-0.82	-0.27	-0.74	0.39	0.27	-1.28	-0.36	-0.81
1049	-0.46	-0.79	-0.41	0.02	-0.2	-2.47	-1.18	-0.71
1050	-0.94	-0.98	-0.42	0.8	0.15	-1.58	-0.16	-0.8
1051	-0.8	-0.57	0.78	0.29	-1.61	-2.05	-0.56	-0.75
MEAN	-0.01	0.02	0.03	-0.01	0.02	-0.01	0.05	0.01
STD	1.065	1.127	1.103	1.072	0.973	1.113	0.988	1.043

Table 30 shows abridged ability scores of examinees on NECO and WAEC Mathematics tests of years 2011, 2012, 2013, and 2014 obtained from phase 3 of BILOG MG calibration module, and their respective means and standard deviations. The obtained ability scores were correlated.

Stage two, correlation of NECO and WAEC mathematics ability scores

Table 31 presents the correlation coefficients of NECO and WAEC mathematics tests of years 2011, 2012, 2013, and 2014.

Table 31: Correlation coefficient of NECO and WAEC mathematics tests

	WAEC 2011	WAEC 2012	WAEC 2013	WAEC 2014
NECO 2011	0.39			
NECO 2012		0.47		
NECO 2013			0.45	
NECO 2014				0.25

Table 31 shows the correlation coefficient of NECO and WAEC Mathematics tests. The correlation coefficients showed that NECO and WAEC Mathematics tests of years 2011, 2012, and 2013 were moderately related (r = 0.39, r = 0.47, and r = 0.45 respectively). Furthermore, the table showed that the relationship between NECO and WAEC Mathematics tests of year 2014 was low (r = 0.25).

Stage three, RiU index estimation

In order to evaluate the extent of equivalence of the two tests in the measurement of Mathematics proficiency of students, the RiU index for the two tests were estimated. Table 33 presents the estimated RiU index for NECO and WAEC Mathematics tests.

Table 32: Reduction in Uncertainty Index of NECO and WAEC Mathematics Tests

Year	RiU index	%
2011	0.079	7.9
2012	0.117	11.7
2013	0.107	10.7
2014	0.032	3.2

Table 32 shows that the estimated Reduction in Uncertainty for NECO and WAEC Mathematics tests of Year 2011, 2012, 2013, and 2014 were 7.9%, 11.7%, 10.7%, and 3.2% respectively. These estimated RiU indices are lower than 50%, the acceptable minimum standard for flagging two tests equivalent in the measurement of the same ability. This result showed that the NECO and WAEC tests of 2011, 2012, 2013, and 2014 are not equivalent in the measurement of mathematical ability.

Research question 5: How reliable are NECO and WAEC mathematics multiple choice tests?

In order to answer this research question, the empirical reliability output obtained from the calibration module of BILOG MG phase 3 for NECO and WAEC Mathematics tests were compared. Table 32 presents the comparison of the empirical reliability of NECO and WAEC Mathematics tests.

Table 33: Reliability coefficients of NECO and WAEC Mathematics tests

	Test	
Year	NECO	WAEC
2011	0.84	0.93
2012	0.95	0.96
2013	0.87	0.97
2014	0.96	0.96

Table 33 shows that the reliability coefficients of NECO mathematics test of years 2011, 2012, 2013, and 2014 are 0.84, 0.95, 0.87, and 0.96 respectively. The table further reveals that the reliability of WAEC Mathematics test of years 2011, 2012, 2013, and 2014 was 0.93, 0.96, 0.97, and 0.96 respectively. Thus, the NECO and WAEC Mathematics multiple choice test of 2011, 2012, 2013, and 2014 were highly reliable.

Research question 6: Are the equating functions for placing the ability estimates of examinees in mathematics test of WAEC on the scale mathematics test of NECO and vice versa symmetrical?

The results are presented as follows:

Table 34 presents the transformed scores of the examinees from NECO scale to WAEC scale and from WAEC scale to NECO scale (see Appendix 10 for the computations used in the transformation).

Table 34: Distribution of ability scores of examinees on NECO Mathematics test transformed to WAEC scale and ability scores of examinees on WAEC Mathematics test transformed to the scale of NECO test

Year	2011				2012				2013				2014			
S/N	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$
1	0.66	-0.46	-0.46	0.71	0.43	0.97	0.9	0.38	0.59	0.41	0.46	0.64	0.91	0.45	0.43	1.93
2	0.89	-0.91	-0.93	0.95	0.58	1.15	1.08	0.52	0.64	0.39	0.43	0.7	1.1	1.63	1.68	2.12
3	-0.41	0.23	0.27	-0.42	0.94	0.65	0.59	0.87	0.56	0.55	0.62	0.61	0.5	1.26	1.29	1.52
4	0.38	0.26	0.31	0.41	0.38	0.87	0.81	0.33	0.91	0.38	0.42	1.01	0.86	1.14	1.16	1.88
5	0.28	0.18	0.22	0.31	0.77	-0.05	-0.09	0.71	0.76	0.06	0.06	0.84	0.87	0.41	0.39	1.89
6	0.38	-0.06	-0.03	0.41	0.65	0.98	0.91	0.59	0.97	0.56	0.63	1.08	-1.56	0.03	-0.01	-0.54
7	0.99	0.27	0.32	1.06	0.63	0.98	0.91	0.57	0.6	0.32	0.35	0.66	1.16	1	1.01	2.18
8	0.62	0.63	0.7	0.67	0.75	1.12	1.05	0.69	0.45	0.52	0.58	0.48	1.47	1.5	1.54	2.49
9	-0.13	0.26	0.31	-0.13	0.46	-0.36	-0.39	0.41	-1.25	0.6	0.68	-1.46	0.89	0.98	0.99	1.91
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
1037	-1.87	-0.98	-1	-1.97	-0.5	-0.41	-0.44	-0.53	-0.87	-0.89	-1.03	-1.03	-0.87	-1.3	-1.41	0.15
1038	-0.48	-1.19	-1.23	-0.5	-0.56	-1.17	-1.18	-0.58	0.3	-1.08	-1.25	0.31	-1.36	-0.22	-0.27	-0.34
1039	-1.89	-0.7	-0.71	-1.99	-2.73	-1.39	-1.39	-2.69	-1.56	-0.89	-1.03	-1.81	-0.86	-0.57	-0.64	0.16
1040	-1.82	-0.59	-0.59	-1.92	-0.71	-1.42	-1.42	-0.73	-1.84	-0.73	-0.85	-2.13	-0.21	-1.38	-1.5	0.81
1041	-0.55	-0.71	-0.72	-0.57	-0.43	0.3	0.25	-0.46	-0.87	-0.09	-0.12	-1.03	-0.7	-1.14	-1.25	0.32
1042	-1.05	-0.65	-0.66	-1.1	0.29	0.81	0.75	0.24	-1.82	-1.09	-1.26	-2.11	-0.13	-0.01	-0.05	0.89

1043	-1.32	-0.91	-0.93	-1.39	-0.5	0.6	0.54	-0.53	-0.75	-0.16	-0.19	-0.89	-0.54	-1.14	-1.25	0.48
1044	-0.30	-0.49	-0.49	-0.31	0.19	-0.15	-0.18	0.14	-0.15	-1.14	-1.32	-0.2	-0.02	-1.19	-1.3	1
1045	-0.85	-0.83	-0.85	-0.89	-0.1	0.76	0.7	-0.14	-0.42	-1.01	-1.17	-0.51	0.15	-1.29	-1.4	1.17
1046	-0.36	-1.16	-1.2	-0.37	0.24	1.39	1.31	0.19	-0.54	-0.88	-1.02	-0.65	-0.34	-0.71	-0.79	0.68
1047	-0.27	-0.12	-0.1	-0.28	-0.23	0.3	0.25	-0.26	-0.32	-1.09	-1.26	-0.4	-0.16	-1.93	-2.08	0.86
1048	-0.82	-0.29	-0.27	-0.86	-0.74	0.44	0.39	-0.76	0.27	-1.11	-1.28	0.28	-0.36	-0.73	-0.81	0.66
1049	-0.46	-0.78	-0.79	-0.48	-0.41	0.06	0.02	-0.44	-0.2	-2.15	-2.47	-0.26	-1.18	-0.63	-0.71	-0.16
1050	-0.94	-0.96	-0.98	-0.98	-0.42	0.86	0.8	-0.45	0.15	-1.37	-1.58	0.14	-0.16	-0.72	-0.8	0.86
1051	-0.8	-0.57	-0.57	-0.84	0.78	0.34	0.29	0.72	-1.61	-1.78	-2.05	-1.87	-0.56	-0.67	-0.75	0.46

Table 34 shows the abridged (see Appendix 8 for the complete version) ability scores of examinees on NECO mathematics test and the corresponding scores on the WAEC test scale, and the ability scores of examinees on WAEC Mathematics test and the corresponding ability scores on NECO test scale. The scatter plots of these functions are presented as follows;

Year 2011

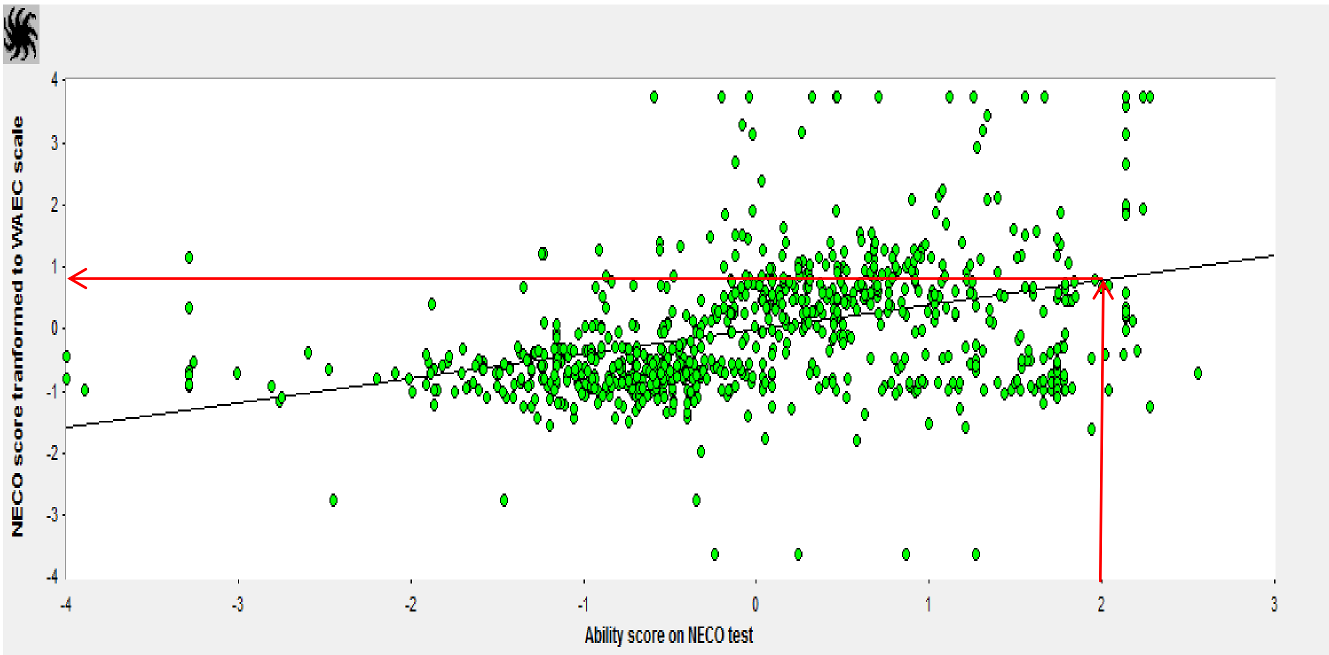

Figure 4.1(a): scatter plot of examinees' ability scores on NECO mathematics test of year 2011 and the examinees ability scores on the scale of WAEC mathematics test of 2011.

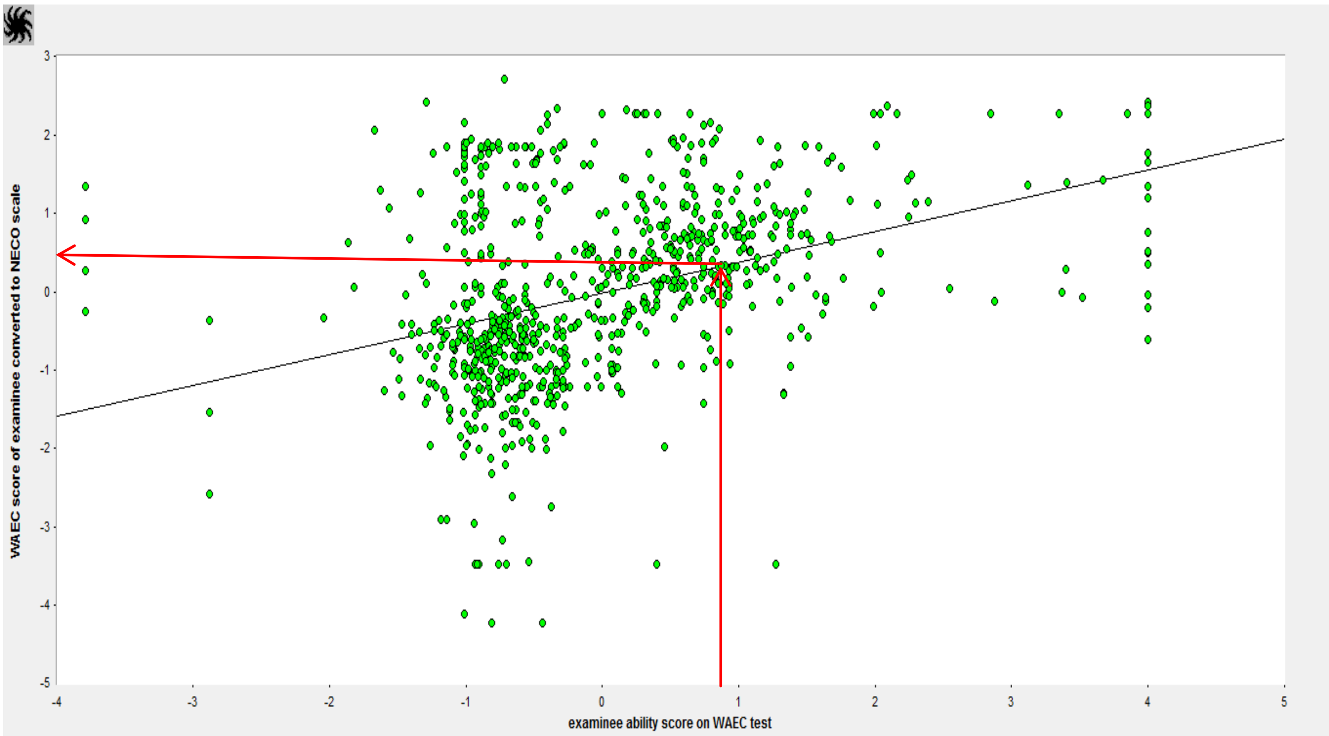

Figure 4.1(b): scatter plot of examinees' ability scores on WAEC mathematics test of year 2011 and the examinees ability scores on the scale of NECO mathematics test of 2011.

Figures 4.1(a) and 4.1(b) present the scatter plots of examinees' ability scores on NECO Mathematics test of year 2011 and the examinees ability scores when converted to the WAEC Mathematics test of 2011 scale, and the examinees' ability scores on WAEC Mathematics test of year 2011 and the examinees ability scores when converted to the NECO Mathematics test of 2011 scale. The slant lines on the graphs are the lines of best fit of the data.

Figure 4.1(a) shows that an ability of +2 on NECO Mathematics test converts to ability score of +0.8 on the WAEC Mathematics test scale. While figure 4.1(b) shows that ability score of +0.8 on WAEC Mathematics converts to ability score of +0.4 on NECO mathematics test scale. The results showed that the functions used in transforming the NECO abilities scores to WAEC scale and vice versa is not symmetrical

For year 2012.

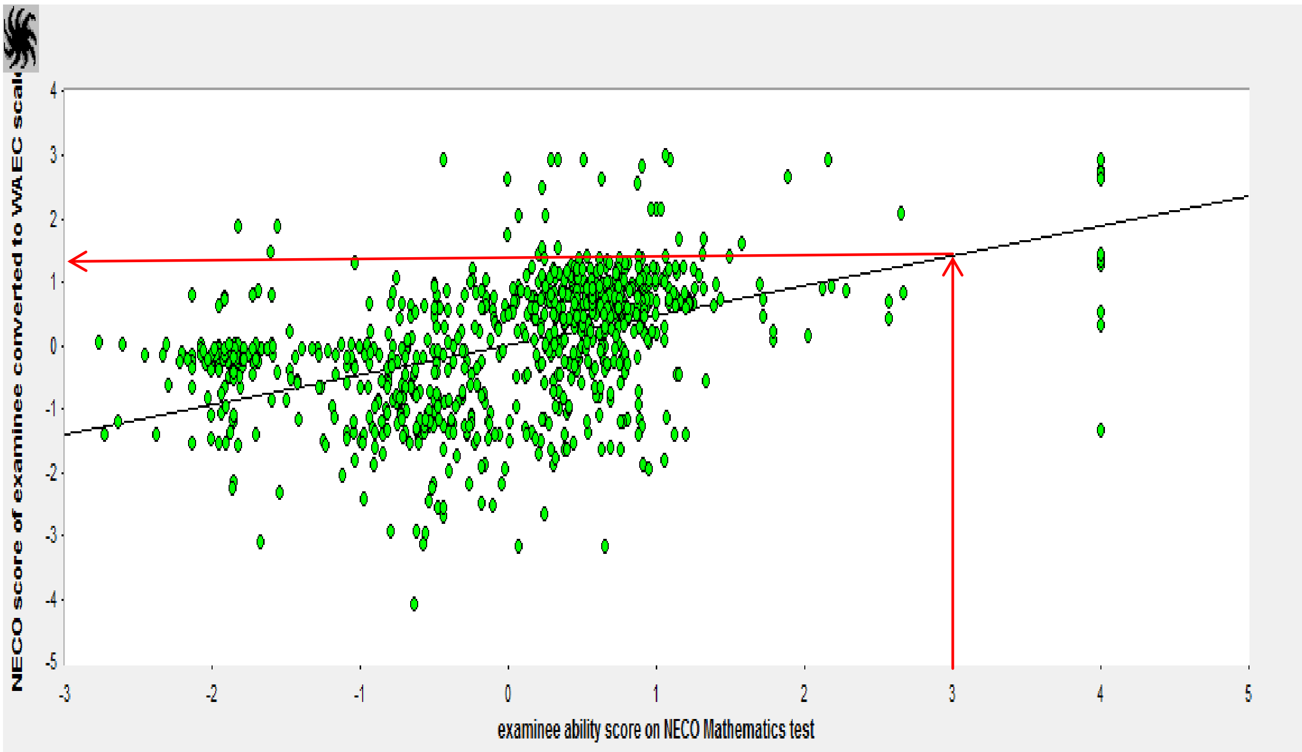

Figure 4.2(a): scatter plot of examinees' ability scores on NECO mathematics test of year 2012 and the examinees ability scores on the scale of WAEC mathematics test of 2012.

Figure 4.2(b): scatter plot of examinees' ability scores on WAEC mathematics test of year 2012 and the examinees ability scores on the scale of NECO mathematics test of 2012.

Figures 4.2(a) and 4.2(b) present the scatter plots of examinees' ability scores on NECO Mathematics test of year 2012 and the examinees ability scores when converted to the WAEC Mathematics test of 2012 scale, and the examinees' ability scores on WAEC Mathematics test of year 2012 and the examinees ability scores when converted to the NECO Mathematics test of 2012 scale. The slant lines on the graphs are the line of best fit of the data.

Figure 4.2(a) shows that an ability of +3 on NECO Mathematics test converts to ability score of +1.3 on the WAEC Mathematics test scale. While figure 4.2(b) shows that ability score of +1.3 on WAEC Mathematics converts to ability score of +0.6 on NECO mathematics test scale. The results revealed that the functions used in transforming the NECO abilities scores to WAEC scale and vice versa is not symmetrical

For year 2013

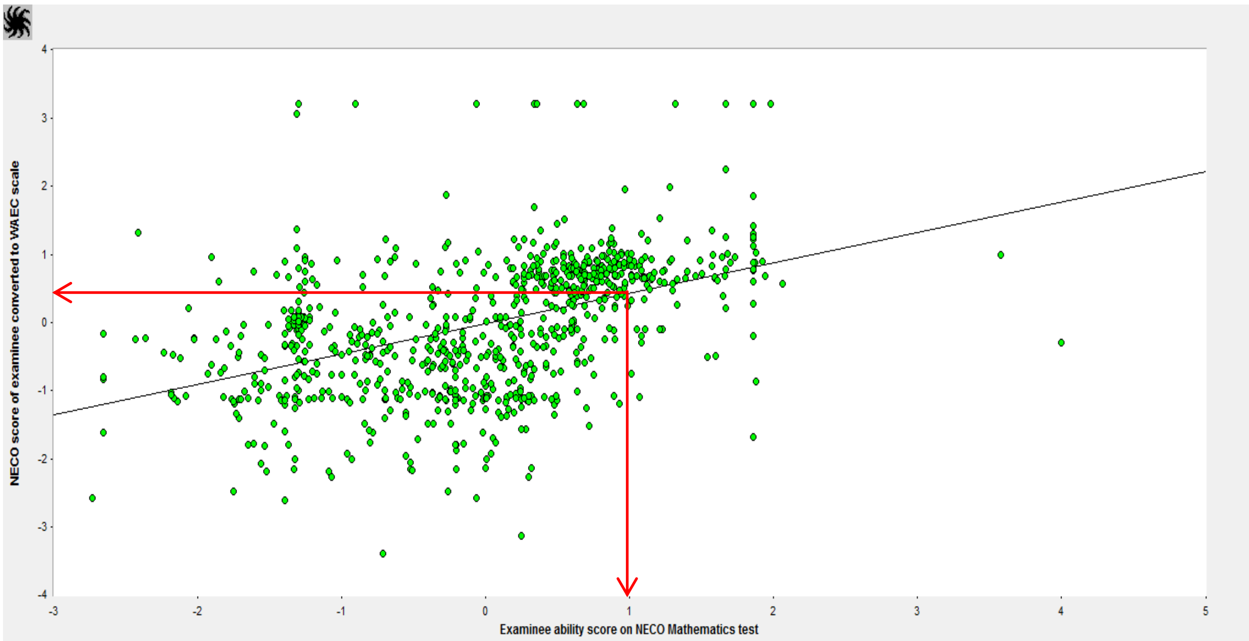

Figure 4.3(a): scatter plot of examinees' ability scores on NECO mathematics test of year 2013 and the examinees ability scores on the scale of WAEC mathematics test of 2013.

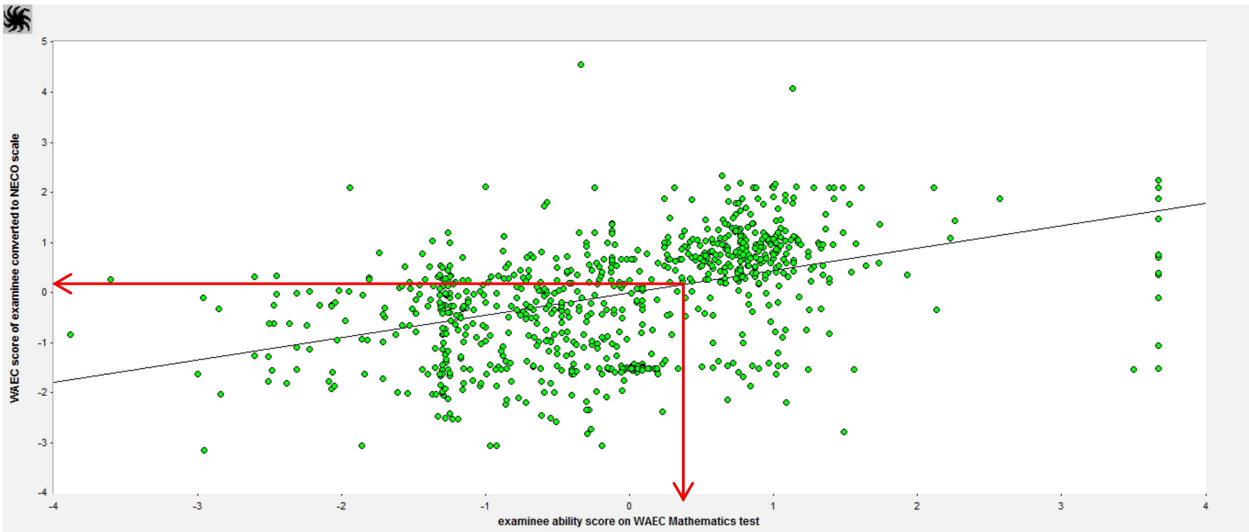

Figure 4.3(b): scatter plot of examinees' ability scores on WAEC mathematics test of year 2013 and the examinees ability scores on the scale of NECO mathematics test of 2013.

Figures 4.3(a) and 4.3(b) present the scatter plots of examinees' ability scores on NECO Mathematics test of year 2013 and the examinees ability scores when converted to the WAEC Mathematics test of 2013 scale, and the examinees' ability scores on WAEC Mathematics test of year 2013 and the examinees ability scores when converted to the NECO Mathematics test of 2013 scale. The slant lines on the graphs are the lines of best fit of the data.

Figure 4.3(a) shows that an ability of +1 on NECO Mathematics test converts to ability score of +0.4 on the WAEC Mathematics test scale. While figure 4.3(b) shows that ability score of +0.4 on WAEC Mathematics converts to ability score of +0.2 on NECO mathematics test scale. The results showed that the functions used in transforming the NECO abilities scores to WAEC scale and vice versa is not symmetrical.

For Year 2014

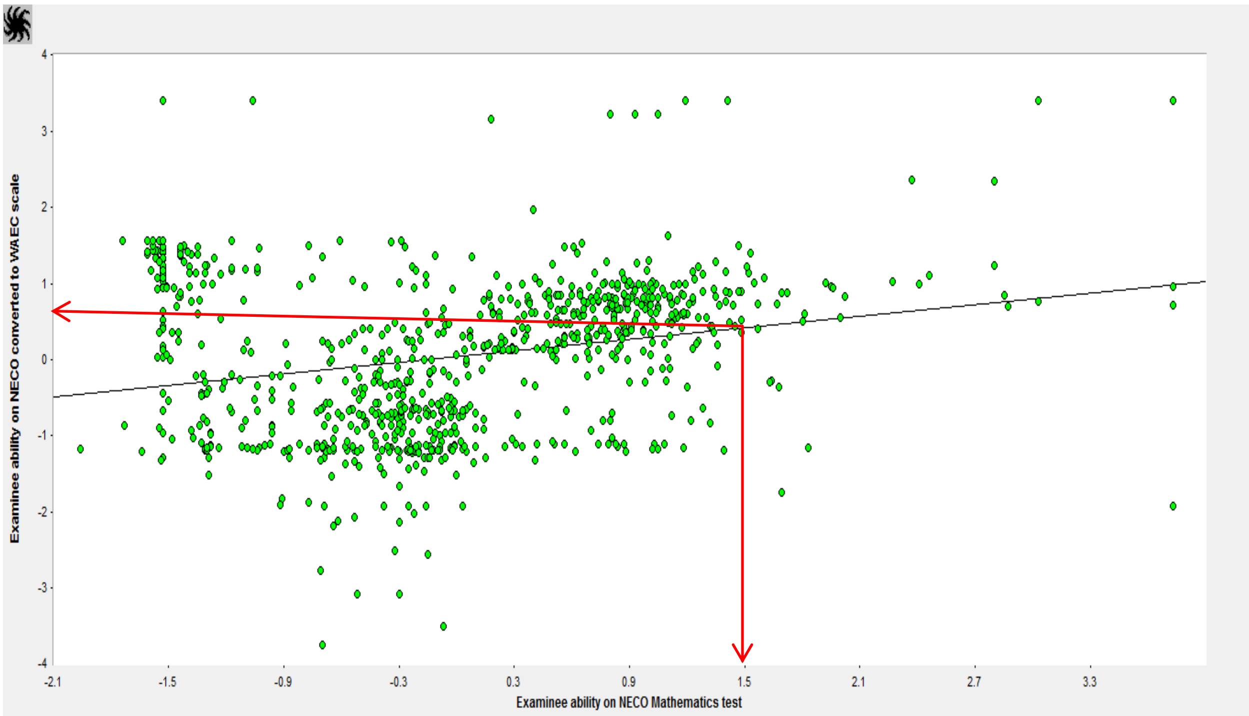

Figure 4.4(a): scatter plot of examinees' ability scores on NECO mathematics test of year 2014 and the examinees ability scores on the scale of WAEC mathematics test of 2014.

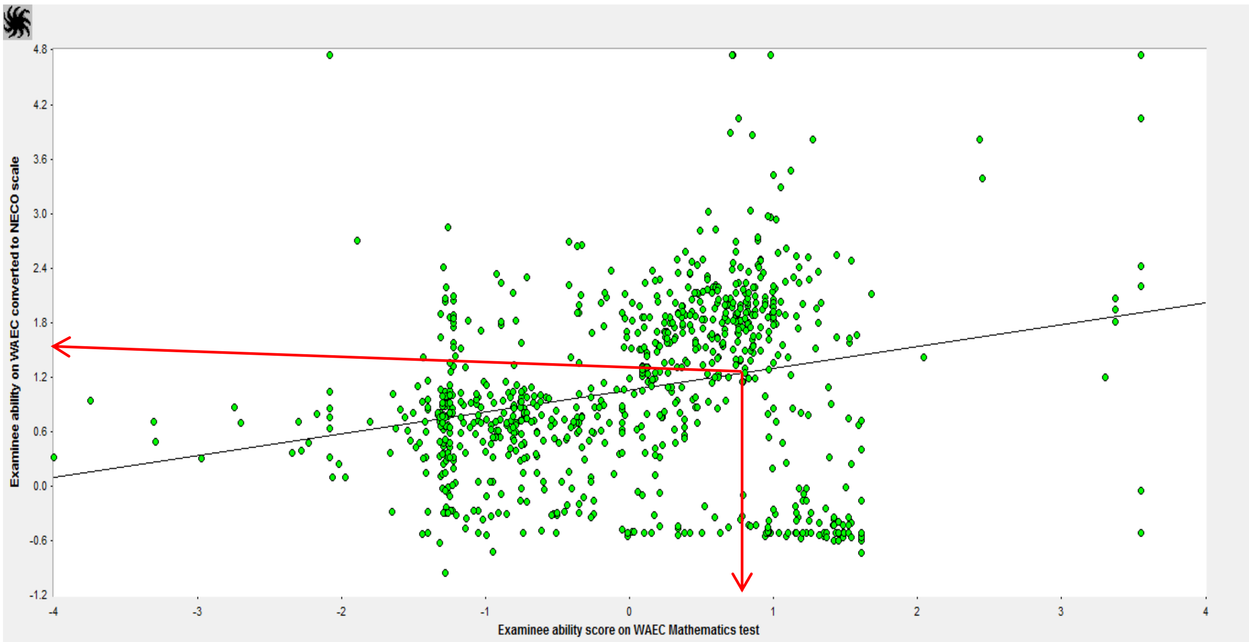

Figure 4.4(b): scatter plot of examinees' ability scores on WAEC mathematics test of year 2014 and the examinees ability scores on the scale of NECO mathematics test of 2014.

Figures 4.4(a) and 4.4(b) present the scatter plots of examinees' ability scores on NECO Mathematics test of year 2014 and the examinees ability scores when converted to the WAEC Mathematics test of 2014 scale, and the examinees' ability scores on WAEC Mathematics test of year 2014 and the examinees ability scores when converted to the NECO Mathematics test of 2014 scale. The slant lines on the graphs are the line of best fit of the data.

Figure 4.4(a) shows that an ability of +1.5 on NECO Mathematics test converts to ability score of +0.7 on the WAEC Mathematics test scale, while figure 4.4(b) shows that ability score of +0.7 on WAEC Mathematics converts to ability score of +1.5 on NECO mathematics test scale.

HYPOTHESES

1. There is no significant relationship between the unidimensionality of NECO and WAEC Mathematics multiple choice tests.

The results are presented as follows:

Table 35: Z-transformation of correlation coefficient between NECO and WAEC Mathematics multiple choice test unidimensionality

	N	R	Z_{cal}	Z_{tab}	Decision
2011	1051	0.487	18.06	1.96	Reject, Ho
2012	1051	0.556	21.665	1.96	Reject, Ho
2013	1051	0.607	24.738	1.96	Reject, Ho
2014	1051	0.369	12.859	1.96	Reject, Ho

Table 35 presents the Z-transformation of correlation coefficient of the factor scores of NECO and WAEC Mathematics multiple choice tests showing the extent of similarity of the unidimensionality of the tests. The table shows that the unidimensionality of NECO and WAEC Mathematics multiple choice test were moderately related across 2011, 2012, 2013 and 2014 respectively (r = 0.487,0.556,0.607 and 0.369).For 2011, 2012, 2013, and 2014, the calculated Z-value was greater than the critical value (1.96) at 0.05 level of significance.Therefore the null hypothesis was rejected. Hence there is significant relationship between the unidimensionality of NECO and WAEC Mathematics multiple choice tests from 2011 to 2014.

2. There is no significant difference between the reliability estimates of NECO and WAEC Mathematics multiple choice tests.

The results are presented as follows:

Table 36: Dependent alpha of significance test of reliability estimates of NECO and WAEC Mathematics multiple choice tests

Year		Reliability	N	P	P^2	Z_{Cal}	Z_{Tab}	Decision
2011	NECO	0.84	1051	0.39	0.15	-14.94	1.96	Reject, Ho
	WAEC	0.93						
2012	NECO	0.95	1051	0.47	0.22	-4.10	1.96	Reject, Ho
	WAEC	0.96						
2013	NECO	0.87	1051	0.45	0.20	-28.99	1.96	Reject, Ho
	WAEC	0.97						
2014	NECO	0.96	1051	0.25	0.06	0.00	1.96	do not Reject Ho
	WAEC	0.96						

Table 36 presents the dependent alpha of significance test of reliability estimates of 2011 to 2014 NECO and WAEC Mathematics multiple choice tesst showing the extent of equivalence of the reliability estimates of the tests. For 2011, 2012, and 2013 respectively, the calculated Z-value was greater than the critical value (1.96) at 0.05 level of significance. As a result, for 2011, 2012, and 2013 respectively, the null hypothesis was rejected. Thus, there was significant difference between the reliability estimates of NECO and WAEC Mathematics multiple choice tests of 2011, 2012 and 2013. Furthermore, the table revealed that for 2014, the critical value was greater than the calculated Z-value. Therefore for 2014, the null hypothesis was not rejected. This implies that there was no significant difference between the reliability estimates of NECO and WAEC Mathematics multiple choice tests of 2014.

Summary of the major Findings

From the analyses presented in this chapter, the major findings that emerged from the study revealed that;

1. NECO and WAEC Mathematics tests of 2011, 2012, 2013, and 2014 were all unidimensioal.
2. There is significant relationship between the unidimensionality of NECO and WAEC Mathematics multiple choice tests from 2011 to 2014.
3. NECO and WAEC mathematics test items of years 2011, 2012, 2013, and 2014 were locally independent.
4. NECO Mathematics test items of years 2011, 2012, and 2013 were more locally independent than the WAEC test items of the respective years, while in 2014 WAEC test items were more locally independent than those of NECO.
5. The certainty of equivalence of NECO and WAEC Mathematics tests in the measurement of same ability is very low across the years (i.e., years; 2011, 2012, 2013, and 2014).
6. NECO and WAEC Mathematics test for 2011, 2012, and 2013 had high but different reliability estimates, while in 2014 NECO and WAEC Mathematics tests had high and equal reliability estimates.

7. There was significant difference between the reliability estimates of NECO and WAEC Mathematics multiple choice tests of 2011, 2012 and 2013. For 2014 there was no significant different between the estimated reliabilities of NECO and WAEC.
8. The functions used in transforming ability scores of examinees on NECO mathematics test to the scale of WAEC test and the function used in transforming ability scores on WAEC test to the scale of NECO test for year 2011, 2012, and 2013 were far from being symmetrical, while in 2014 the functions were approximately symmetrical.
9. NECO and WAEC mathematics tests of 2011, 2012, 2013, and 2014 did not fulfil all the conditions that are required for test scores obtained from two tests designed to measure the same ability of examinees to be used interchangeably, therefore they are not equivalent.

CHAPTER FIVE

DISCUSSION OF RESULTS, CONCLUSION AND RECOMMENDATIONS

This chapter is divided into the following sub-headings: Discussion of results, Conclusion(s) , Implications of the study, Recommendation(s), Limitations of the study, Suggestions for further study.

Discussion of Results

The discussion of result was done under the following subheadings: unidimensionality, comparability of local independence, Equivalence of WAEC and NECO Mathematics tests in the measurement of the same ability, reliability estimates of WAEC and NECO Mathematics test, symmetry of functions for transforming the ability score of WAEC to the NECO scale and NECO to the scale of WAEC.

Unidimensionality of NECO and WAEC Mathematics tests

The results revealed that the NECO and WAEC mathematics tests of year 2011, 2012, 2013, and 2014 respectively as principal component analysis produced eigenvalues whose ratio of the first component to that of the second component were equal to or greater than two to one (2:1) which is the minimum standard for flagging a test unidemensional. These findings suggest that NECO and

WAEC mathematics tests were unidimensional. This implies that NECO and Mathematics tests measure approximately, one dominant trait (i.e., Mathematics proficiency) of examinees.

On the comparability of the unidimensionality of the WAEC and NECO Mathematics tests, the results revealed that there was no significant difference between the unidimensionality of NECO and WAEC mathematics multiple choice tests of 2011, 2012, 2013, and 2014. The findings suggest that WAEC and NECO tests measure mathematics proficiency in similar manner.

The criteria which enforced the results is in line with the set condition for assessing unidimensionality by Hambleton (2004), Orlando, Sherbonve and Thissen (2001). According to Orlando, Sherbonve and Thissen (2001), and Hambleton (2004), a dichotomized test items are considered unidimensional when the first eigenvalue is substantially greater than the next. The findings in term of unidimensionality of the Mathematics tests of the two examining bodies agrees with that of Metibemu (2016), who found that tests with eigenvalue ratio of first component to the second component is 2:1 or more were unidimensional.

Comparability of Local independence of NECO and WAEC mathematics tests items

The results revealed that the NECO and WAEC Mathematics test items of years; 2011, 2012, 2013, and 2014 were locally independent as a larger percentage of the correlation coefficients of pairs of NECO and WAEC Mathematics tests' items that fall within the range ≤ 0.299 (the minimum standard for adjudging locally independent, individual items that is paired together on tetrachoric correlation analysis) were close to zero. This finding agrees with that of Ojerinde (2013) who found that test items set by larger percentage of pairs of items correlation coefficients falling within the range ≤ 0.299.

More importantly, the finding of this study validates the findings of the study of Olabode (2014), in which the results revealed that both NECO and WAEC Mathematics tests items of year 2012 were locally independent when the local independence of NECO and WAEC Mathematics test items of year 2012 were assessed and compared using responses of 500 senior secondary school year III students of Ogun state to WAEC and NECO Mathematics test.

Furthermore, the results revealed that NECO Mathematics test items for years 2011, 2012, and 2013 were more locally independent than the WAEC test items of the respective years as the percentage of inter- item correlation coefficients for NECO Mathematics questions whose values were below 0.300 were greater than that of WAEC.

However, WAEC Mathematics test items for 2014 were more locally independent than NECO Mathematics test items. The findings of the current study as regards the Mathematics test items of the two examining bodies for years 2011, 2012, and 2013 is in line with the findings of the study of Olabode (2014) on the comparison of local independence of NECO and WAEC Mathematics tests items for year 2012. In this regard Olabode's study submitted that NECO Mathematics test items were more locally independent than the WAEC's counterparts.

Equivalence of NECO and WAEC Mathematics tests in the measurement of the same ability

The results revealed that the certainty of equivalence of NECO and WAEC Mathematics test in the measurement of same ability is very low across the years (i.e., years; 2011, 2012, 2013, and 2014) as the estimated Reduction in Uncertainty for NECO and WAEC Mathematics tests for Years 2011, 2012, 2013, and 2014 were 7.9%, 11.7%, 10.7%, and 3.2% respectively. These estimated RiU indices are lower than 50%, the acceptable minimum standard for flagging two tests equivalent in the measurement of the same ability as stated by Dorans (2000; 2004).

Reliability estimates of NECO and WAEC Mathematics test

The results revealed that the reliability coefficients of NECO and WAEC mathematics tests for years 2011, 2012, 2013, and 2014 respectively were high. The results further revealed that there was significant reliabilities of NECO and WAEC Mathematics tests for years 2011, 2012, and 2013. But for 2014 there was no significant difference between the reliability estimates of NECO and WAEC Mathematics test. The findings suggest that WAEC and NECO Mathematics tests are highly reliable. However, the findings further suggest that the WAEC and NECO mathematics tests reliabilities are not equivalent for 2011, 2012, and 2013. The findings of the current study regarding the reliabilities estimates of NECO and WAEC Mathematics tests agree with those of the studies of Bamidele and Adewale (2013) and Kolawole (2007). These studies found that NECO and WAEC Mathematics tests are highly reliable. On comparison of the Mathematics tests of the two examining bodies for years 2011, 2012, and 2013, the findings of the current study disagree with the submission of the studies of Bamidele and Adewale (2013) and Kolawole (2007) which found that NECO and WAEC mathematics tests had equal reliability estimates. However, the finding of the current study regarding the comparison of reliability estimates of NECO and WAEC Mathematics tests for year 2014 agrees with the findings of Bamidele and Adewale (2013) and

Kolawole (2007) which submitted that NECO and WAEC mathematics tests had equal reliability estimates.

Symmetry of the functions for transforming ability scores of examinees on NECO Mathematics test to the scale of WAEC test and the functions for transforming ability scores of examinees on WAEC Mathematics test to the scale of NECO test.

The results revealed that the functions for transforming ability scores of examinees on NECO Mathematics test to the scale of WAEC test and the functions for transforming ability scores of examinees on WAEC Mathematics test to the scale of NECO test for years; 2011, 2012, and2013 were not symmetrical as the scores on NECO scale converted to WAEC scale was not the same with the score on WAEC scale when converted to NECO scale. However, the functions for transforming ability scores of examinees on NECO Mathematics test to the scale of WAEC test and the functions for transforming ability scores of examinees on WAEC Mathematics test to the scale of NECO test for year 2014 were symmetrical as the scores on NECO scale converted to WAEC scale was the same with the score on WAEC scale when converted to NECO scale. The condition which informed the findings is predicated on the assessment of symmetry of equating functions established by Lord (1980) and validated by Kolen and Brennan (2004; 2014). The condition states that for the equating functions used to transform scores on one test form to the other and vice versa to be symmetrical, the function used to transform test scores on test 1 to the scale of test 2must be the inverse of the function used to transform test scores on test 2 to the scale of test 1. That is, if the scatter grams of the equating functions are plotted, an ability score of +2 on test 1 converts to any ability score say +3 on test 2 scale, then an ability score of +3 on test 2 must convert to ability score of +2 on test 1 scale.

Conclusion

From the findings of the study, the conclusion was that NECO and WAEC mathematics multiple –choice tests for 2011, 2012, 2013 and 2014 are unidimensional and the test items are locally independent. Furthermore, the mathematics multiple-choice tests of the two examining bodies were highly reliable. However, the tests do not fulfil the conditions that are required for test scores obtained from two tests designed to measure the same ability of examinees to be used interchangeably. Therefore, NECO and WAEC mathematics multiple-choice tests are not equivalent in the measurement of examinees proficiency in mathematics. Consequently, NECO and WAEC mathematics test' scores should not be used interchangeably.

Implications of the study

The study revealed that NECO and WAEC mathematics tests of 2011, 2012, 2013 and 2014 are valid and reliable. Furthermore, in comparative terms, the two tests possess different validity and reliability estimates. However, the tests are not equivalent, since the tests did not fulfil all the conditions that are required for test scores obtained from two tests designed to measure the same ability of examinees to be used interchangeably.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Education authorities should review their stands on the equivalence by government fiat placed on the two examinations conducted by WAEC and NECO mathematics test-items.
2. Government should establish a central body that will be saddled with the responsibility of ensuring that WAEC and NECO test are as equivalent as possible.
3. Government should be motivated at all levels to create a psychometric department/unit in their ministry so as to enhance a more practical drive towards ensuring valid and reliable assessment of students.

Limitations of the study

Some of the students used for the first administration of the instrument were unable to complete the subsequent instrument, either because they were absent during the administration or intentionally did not want to continue. This affected the number of students whose scores were used to compute the data.

During the time of this study, it was difficult sourcing and procuring the software, like BILOG MG and LISREL used for the study.

Suggestions for further studies

The following are suggested topics for further investigations

1. Study may be replicated using another population
2. The study may be replicated using another subject offered at SSCE level especially English language.
3. The equivalence of WAEC and NECO mathematics tests of different years may be assessed.
4. The study may be replicated using NECO, WAEC and NABTEB mathematics test.

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APPENDIX 1: Statistics Of Entry And Results Of WAEC And NECO *From* 2004 To 2O14 For Credit Pass.

WAEC				NECO		
Year	Total Sat	A1-C6	%	Total Sat	A1-C6	%
2002	908,235	309,409	34.06	-	408,145	66.16
2003	926,212	341,928	36.91	-	390,962	61.50
2004	1,019,524	346,410	33.97	973,611	381.029	50.35
2005	1,054,853	402,982	38.20	127,1351	514,342	51.59
2006	1,149,277	472,674	41.12	897,791	434,807	48.43
2007	1,249,028	584,024	46.75	961,455	524325	54.53
2008	1340,907	767,396	57.24	1,092,215	776,745	71.11
2009	1345,052	609,849	45.34	1,219,888	45,827	20.84
2010	1306335	548,066	41.94	234,959	45,686	19.44
2011	1308,965	608,866	40.35	1,318,597	22,9878	24.81
2012	1,658.357	838379	50.58	1,645,577	586,892	35.66
2013	1,540,902	864,273	56.09	958,444	291,457	31.98
2014	1,658,304	970,921	58.54	1,646,150	587,044	35.66

APPENDIX 2: Population of Senior Secondary school Students in Imo State for 2014/2015 academic Session

ZONES	No. Of Schools	Local Govt.	SSSI	SSSII	SSSIII	TOTAL
OKIGWE	63	Isiala Mbano	1138	1191	2396	4725
		Okigwe	747	700	1001	2448
			314	280	542	1136
		Ehime Mbano	977	935	1991	3903
		Ihitte Uboma	662	628	1362	2652
		Obowo	690	619	1079	2388
ORLU	98	Ideato North	679	573	763	2015
		Ideato South	453	486	833	1772
		Isu	694	852	941	2487
		Njaba	736	368	624	1728
		Nkwerre	287	261	347	895
		Nwangele	416	414	337	1167
		Orlu	1934	1868	2462	12467
		Orsu	734	624	643	2010
		Oguta	1146	1015	1299	3460
		Ohaji	1079	1033	2251	4363
		Oru-East	1012	983	1505	3500
		Oru-West	783	609	890	2282
OWERRI	113	Ikeduru	1279	1166	1995	4440
		Mbaitoli	1911	1615	1912	5438
		Owerri Municipal	4043	2963	1404	8410
		Owerri North	1791	1724	2271	5786
		Owerri West	1897	1551	2152	5600
		Aboh Mbaise	1307	1254	1366	3927
		Ahiazu Mbaise	1603	1324	1335	4262
		Ezinihitte Mbaise	990	1038	1350	3378
		Ngor Okpala	1304	1190	1985	4479
	274					

Source: Statistics Unit of the State Ministry of Education, Owerri for 2014/2015 academic session.

Appendix 3: SECONDARY SCHOOLS ENROLMENT

2014/2015 **SSS**

	OKIGWE ZONE	M	F	Total	M	F	Total
	Isiala Mbano LGA						
1	Amaraku Comm Sec. Sch.				74	106	180
2	Amauzari Comp. Sec.Sch.				70	48	118
3	Anara Comm. Sec. Sch				160	140	300
4	Comm.. Sec. Sch. Osuachara				46	41	87
5	Comp. Sec. Sch. Mbeke-osu				126	120	246
6	Eziama Sec. Sch. Osu-Ama				72	78	150
7	Ezihe Comm Comm Sec. Sch				86	98	184
8	Obollo Sec. Tech Sch.				100	80	180
9	Ogbor-Ugiri Comm Sec. Sch				46	42	88
10	Ohohia Sec. Sch				42	50	92
11	Okohia-Osu Tech Colege				83	-	83
12	Umuduru-Osu Comm Sec. Sch				115	159	274
13	Umuneke-Ugiri Sec Sch				86	80	166
14	Umunkwo Girls Sec. Sch				-	25	25
15	Umuozu Sec. Sch Ugiri				95	91	25
			Total		12011	1158	2359
	OKIGWE L.G.A						
1	Agbobu Comm Sec; Sch.				125	118	243
2	Aku Comm Sec. Sch.				30	50	80
3	Comm.. Sec. Sch. Okigwe				62	50	114

4	Ezinachi Comm. Sec Sch.	70	75	145
5	Girls Sec. Sch. Ihube	32	68	100
6	Umulolo Boys Sec. School	16	-	16
7	Umulolo High School	0	41	41
8	Umuowa-Ibu Sec Tech. Sch	9	13	22
9	Urban Sec. Sch. Ubaha-Okigwe	94	66	160
	Total	438	481	919
	Onuimo L.G.A			
1	Comm. Sec Sch. Okwe	44	50	94
2	Okigwe National Grammar School	61	33	94
3	Okwelle Sec. Sch. Okwelle	10	11	21
4	Umucheke Okwe Compr Sec.	42	57	99
5	Umuduru Egbeaguru Sec. Sch	16	14	30
	TOTAL	173	165	338

SECONDARY SCHOOLS ENROLMENT - IMO STATE

2014/2015

	OKIGWE ZONE	M	F	Total	SSS M	F	Total
	Ehime Mbano LGA						
1	Agbaghara Nsu Comm. Sec. Sch.				43	50	93
2	Agbaja Sec Tech Sch				67	50	117
3	Model Sec. Sch. Umualumaku/Umuihim				50	36	86
4	Comm.. Sec. Sch. Umunumo				58	76	134
5	Compr. Sec. Sch. Umunakanu				21	36	57
6	Dioka Nzerem Comm. Sec. Sch.				38	29	67
7	Ezeoke High Sch, Nsu				30	20	50
8	Ibeafor Sec Sch Umunumo				80	86	166
9	Nsu Compr. High Sch. Umuanunu				73	95	168
10	Umuduru-Nsu Boys Sec. Sch				35	40	75
11	Umueleke/Umueze Sec. Commerical S				15	50	65
12	Umueze 1 Sec. Tech Sch.				50	62	112
13	Umueze 11 Sec. Sch.				67	65	132
14	Umukabia Sec. Sch				24	44	68
15	Umuezeala Sec. Sch				58	39	97
16	Union Compr Sec Sch				25	26	51
17	Umuezeala Ogwara Sec. Sch				31	38	69
	Tota				795	842	1637
	IhitteUboma L.G.A Sch..						
1	Abueke Coom Sec.				78	68	146
2	Amainyi High School				23	32	55
3	Amainyinta Comm Sec. Sch.				49	39	88
4	Amakohia Sec. Sch.				18	47	65
5	Boys High Sch. Amauzu-Ihitte				47	40	87
6	Madonna See. Sch Etiti				39	40	79
7	Nwaeruru Mbakwe Compr Sec Sch. Umuihi				48	23	61
8	Okata Compr. Sec Sch.				65	40	105
9	Ohoma Sec Sch Ikperejere				40	50	90
10	Umuezegwu Sec. Tech Sch.				52	65	117
	Total				459	494	953
	Obowo LGA						
	Achara Sec. Commera Sch.				82	68	150
	Amanze Compr Sec. Sch				50	80	130
	Avutu Sec Tech Sch				30	50	80
	Ehunachi Compr Sec. Sch.				64	47	111
	Okenalogho Sec. Tech Sch. :				40	31	71
	Okwuohia Comm Sec. Sch.				100	153	253
	Umuariam Sec. Tech Sch				112	88	200

	Total				478	517	995

SECONDARY SCHOOLS ENROLMENT - IMO STATE

	2014/2015				SSS		
	ORLU ZONE	M	F	total	M	F	Total
	Ideato North LGA						
1	Akokwa Nigh School				54	67	121
2	Akokwa Sec. Tech. Sch.				6	22	48
3	Akpulu Sec. Sch				43	46	89
4	Commercial Sec. Sch. Osina				-	-	-
5	Compr Sec. Sch. Aniche Obinetiti				16	35	51
6	Compr Sec. Sch. Uruala				40	36	76
7	Iheme Mem S.S. Arondizuogu				29	31	60
8	National High School Arondizuogu				39	70	109
9	Obodoukwu Sec. Tech Sch.						
	Total				293	338	631
	Ideato South LGA						
1	Amanator Comm Sec. Sch Ogboza				60	36	96
2	Isiekenesi High Sch.				61	77	138
3	National Sec. Sch. Ntueke				58	50	108
4	Sec. Tech. Sch. Dikenafai				59	24	83
5	Ugbele Comm Sec. Sch				46	54	100
6	Umueshi Sec. Sch.				22	16	38
7	Umuma Isiaku Comp. Sec. Sch.				58	68	126
8	Umuobom Comm Se. Sch				29	60	89
	Total				393	385	778
	ISU LGA						
1	Compr Sec. Sch. Amurie Omanze				65	86	151
2	Ebenator Ekwe Sec. Sch.				33	29	62
3	Ekwe Sec. Sch.				150	149	299
4	Isunjaba Compr Sec. Sch				85	-	85
5	Isunjaba High Sch				-	73	73
6	Sec. Etch Sch. Amandugba				-	128	128
	Total				461	464	925
	NJABA LGA						
1	Amucha Sec. Tech Sch.				19	22	41
2	Comp. Sec. Sch Nkume-Isu				45	54	99
3	Girls Sec. Tech. Sch. Umuaka				-	141	141
4	Sec. Compr Sch. Atta				46	98	144
5	Sec. Tech Sch. Okwudor				64	86	150
	Total				174	401	575
	NWKERE LGA						
1	Comm. Sec. Sch. Amaokpara				59	51	110

2	Compr Sec Sch. Eziama Obaire	12	10	22
3	Owerre-Kwoji Sec. Sch.	84	48	132
4	Nkwere High Sch	33	27	60
	Total	188	136	324

SECONDARY SCHOOLS ENROLMENT - IMO STATE

	2014/2015				SSS		
	NWANGELE LGA	M	F	Total	M	F	Total
1	Comm. Sec. school Abba				40	50	90
2	Comm. Sec Sth Agbaja				30	32	62
3	Dick Tiger Mem Sec Sch Amaigbo				38	33	71
4	Isu Girls Sec Sch.				-	24	24
5	Isu High School				-	-	-
6	King Jaja High Sch Amaigbo				52	34	86
	Total				183	198	381
	Orlu LGA						
1	Comm. Sec. Sch Umuna				114	84	198
2	Comm. Sec Sch Mgbee				180	105	285
3	Com Sec. Sch. Obinugwu				28	21	49
4	Compr Sec Sch. Umuzike				82	68	150
5	Eziachi Sec. Sch. Orlu				70	65	135
6	Girls Uzor Compr Coll Diioma				-	200	200
7	Green Uzor Compr Coll Ihioma				66	75	141
8	Ihitte Owerre Comm. Sec. Sch				36	48	84
9	Ogberuru Sec. Sch.				62	59	121
10	Ojike Memorial Sec. Sch				63	37	100
11	OkporoSec				508	4	512
12	Owerre-Ebeiri Comm Sec Sch				42	90	132

13	Sec Tech Sch Umuowa	63	70	133
14	Township Compr Sec. Sch Amaifeke	31	50	81
15	Umueze Comm Sec. Sch Amaike	90	902	992
16	Umutanze Comm Sec. Sch.	83	90	173
	Total	1518	117	2635
	Orsu LGA			
1	Amanachi Commercial Sec. Sch	68	100	168
2	Comm. Sec Sch Awo-idemili	50	31	81
3	Eziawa Compr. Sec Sch	40	31	71
4	Girls Sec, Sch Awo-idemili	-	74	74
5	Ihittenansa Sec. Sch.	49	81	130
6	Orsu-Ihitteukwa Sec. Sch	90	62	152
7	Umuhu Okabia Sec Sch'	45	62	107
	Total	342	441	783

SECONDARY SCHOOLS ENROLMENT - IMO STATE

	2014/2015				SSS		
	ORUL ZONE	M	F	Total	M	F	Total
	Oguta LGA						
1	Agwa Sec. Sch.				144	106	250
2	Comm.. sec Sch Awa				111	107	218
3	Egbuoma Sec. Sch.				58	102	160
4	Ejemekwuru/Akabor Sec. Sch.				60	60	120
5	Eziorsu Sec. Sch.				111	90	201
6	Izombe Sec. Commercial Sch.				35	35	70
7	Priscillia Mem Se				98	95	193
8	St Micheals Sec Sch Orsuobodo				80	82	162

9	Trinity High Sch.	60	-	60
10	Umunwamma Girls Sec. Sch Izombe	-	-	-
	Total	751	677	1434
	Ohaji/Egbema LGA			
1	Abacheke Compr Sec Sch Egbema	-	-	-
2	Comm.. Sec Sch Awara	20	76	96
3	Commercial Sec. Sch Assa	46	68	114
4	Mmahu Sec Sch Egbema	66	71	137
5	Obosima Sec. Tech School	72	74	146
6	Ohuoba Compr Sec. Ohaji	87	60	147
7	Umuapu Sec. Sch. Ohaji	001	71	72
8	Umudike Compr Sec. Sch.	73	77	150
9	Umuokanne Compr Sec. Sch.	148	97	245
10	Egbema Sec. Sch	50	37	87
11	Umunwaku Sec. Sch.	60	86	146
	Total	823	718	1541
	Oru East LGA			
1	Akatta Sec. Sch.	65	129	194
2	Akuma Sec. Sch	77	99	176
3	Amiri Girls Sec. Sch	73	63	136
4	Amiri Girls Sec Sch.	-	120	120
5	Compr Sec Sch Awo-Omamma	52	90	142
6	Omuma Sec. Tech Sch.	58	40	98
7	Sec Tech. Sch Awo-Omamma	104	95	199
8	Ubogwu Sec. Comm Sch. Awo-Omamma	51	74	125
	Total	480	712	1192
	Oru West LGA			
1	Comp Sec. Sch Ozara	47	51	98

2	Comp Sec. Sch Ubulu	90	82	172
3	Compr Sec Sch Ibiasegbe	92	52	144
4	Mgbidi Sec Sch	66	-	66
5	Nempi Sec. Sch	80	72	152
6	Ohakpu Sec Compr School	39	44	83
7	Otulu Sec. Comml Sch.	30	18	48
8	Umuorji Girls Sec. Sch Mgbidi	-	113	113
	Total	374	432	806

SECONDARY SCHOOLS ENROLMENT - IMO STATE

	2014/2015				SSS		
	OWERRI ZONE	M	F	Total	M	F	Total
	Ikeduru						
1	Amaimo Comm Girls Sec School				-	78	78
2	Amatta Comm Sec. Sch				51	41	92
3	Atta Boys Sec. Sch				66	69	135
4	Comm. Sec. Sch Ugirike				50	100	150
5	Comm. Sec Sch Inyishi				51	34	85
6	Compr Sec. Sch Avuvu				52	48	100
7	Iho-Dimeze Compr Sec. Sch				105	82	187
8	Ngugo Compr Sec. Sch Ikeduru				37	46	83
9	Owu-Amakohia Sec. Sch				40	50	90
10	Se. Commer Sch. Eziama				62	75	177
11	Umudimsec Sch.				46	74	120
12	Umuoziri Sec. Tech Sch.				48	72	120
13	Uzoagba Sec. Sch.				90	55	145
	Total				751	677	1434
	Mbaitoli LGA						
1	Afara Sec Sch				43	48	91

2	Comm. Sec. Sch Eziama Obiato	46	54	100
3	Comm.. Sec. Sch Mbieri	87	37	124
4	Comm. Sec. Umuonyeali	46	32	78
5	Compr Sec. Sch Ogwa	69	61	130
6	Compr Sec Sch Ubommiri	78	-	78
7	Girls Sec Sch Ifakala	-	37	37
8	Girls Sec. Sch Ubommiri	-	98	98
9	Ifakala Comm Sec Sch	56	60	116
10	IMS Deaf and Dumb Orodo	35	25	60
11	Mbieri Sec. Tech Sch	34	18	52
12	Obazu Girls Sec Sch	-	211	211
13	Ogbaku Girls Sec, Sch.	-	98	98
14	Orodo Sec Tech Sch	46	65	111
15	Umueze Ogwa Sec. Sch. Ogwa	10	49	59
16	Umunoha Ogwa Sec. Sch. Ogwa	81	79	166
17	Umunoha Sec Sch	65	53	118
18	Umuobom Comm. Sec. Sch. Mbieri	-	-	-
	Total	781	1055	1842
	Owerri Municipal			
1	Boys Sec. Sch New Owerri	238	-	238
2	Comp. Dev. Sec. Sch. Douglas Rd. Owerri	174	224	394
3	Emmanuel College Owerri	54	-	54
4	Govt Sec. Sch. College Owerri	571	-	571
5	Govt. Technical College Owerri	211	-	211
6	Ikenegbu Girls Sec. Sch. Owerri	-	240	240
7	Urban Dev. Sec. Sch.	58	164	222
8	Owerri City College	-	-	-
9	Young Scientist College Owerri	-	-	-
	Total	1106	628	1734

SECONDARY SCHOOLS ENROLMENT - IMO STATE

2014/2015 SSS

	Owerri North LGA Oguta LGA	M	F	Total	M	F	Total
1	Agbala Sec. Sch.				60	80	140
2	Akwakuma Girls Sec. Sch.				-	203	203
3	Cassita Maria Sec. Sch. Emekuku				-	122	122
4	Comm. Sec. Sch. Obibiezena				86	91	177
5	Comm. Sec. Sch. Emekuku				49	33	82
6	Compr Sec. Sch. Amakohia				166	106	272
7	Compr Sec. Sch. Emekuku				42	38	80
8	Compr Sec. Sch. Orji				-	-	-
9	Development Sec Sch Mbaoma Emii				43	30	73
10	Egbu Comp. Sec Sch.				63	63	126
11	Emekuku High School				40	-	-
12	Emii Sec. Tech Sch.				83	75	158
13	Naze Sec. Sch.				119	121	140
14	Ogbeke Obibi Sec. Sch.				80	120	200
15	Uratta Sec. Sch.				61	47	108
16	Obube Compr Sec. Sch. Egbele				-	-	-
	Total				892	1132	2024
	Owerri West LGA						
1	Amakohia Ubi Sec. Sch.				43	47	90
2	Ara Sec. Sch				117	130	247

3	Army Day Sec. Sch. Obinze	83	67	150
4	Comp. Sec. Sch. Emeabiam	30	60	90
5	Compr Sec. Sch Avu	38	50	88
6	Eziobodo Sec. Tech Sch	70	82	152
7	Ihiagwa Sec. Sch.	71	79	150
8	Ndegwu Sec. Sch.	144	146	290
9	Nekede Sec. Sch.	59	61	120
10	Oforola Comm Sec Sch	70	82	152
11	Orogwe Comm Sec School	100	104	204
12	Sec. Tech Sch Irete	53	42	95
	Total	878	950	1828

SECONDARY SCHOOLS ENROLMENT - IMO STATE

	2014/2015				SSS		
	OWERRI ZONE	M	F	Total	M	F	Total
	Oboh Mbaise LGA						
1	Comm. Sec. School Lagwa				26	24	50
2	Compr Sec. School Amuzu				28	44	72
3	Lorji COmm Sec Sch				45	50	95
4	Mbaise Sec. School				87	-	87
5	Mbutu Sec. Commercial School				85	65	150
6	Nguru Sec. Tech School				85	65	150
7	Nguru Sec. Tech School				65	75	140
8	Oke-Ovoro Sec. Sch				22	87	109
9	Okwuato Sec. School				83	128	211
10	Uzunorji Comm Sec. School				74	51	125
	Total				622	570	1192
	Ahiazu LGA						
1	Ahiara Techical College				181	1	182

2	Ahiazu Sec. Sch. Afor-Oru	34	33	67
3	Comm. Sec Sch. Obodo Ahiara	68	102	170
4	Comm. Sec Sch. Amuzi	44	81	125
5	Ihenworie Sec Sch.	50	60	110
6	Okirika Nweke Compr Sec. Sch	31	35	66
7	Oparanadim Comp. Sec. Sch.	66	59	125
8	Sec. Comnl Sch.Otulu Ahiara	35	48	83
9	Sec. Tech. Sch Obohia	57	93	150
10	Umuokirika Sec. Tech Sch.	14	12	26
	Total	580	524	1104
	Ezinihitte LGA			
1	Chokoneze Sec. Tech. School	30	40	70
2	Comm. Sec. Sch. Itu	46	38	84
3	Comm. Sec. Sch. Obizi	18	32	50
4	Eziagbogu Sec Sch.	31	51	82
5	Eziudo Girls High Sch.	-	91	91
6	Eziudo Sec. Tech. Sch.	70	-	70
7	Thitte Ezinihittte Sec. Sch.	70	67	137
8	Ime-Onicha Compr Sec Sch.	31	43	74
9	Obizi-High Sch.	85	-	85
10	Oboamma Sec. Sch	30	45	75
11	Okpofe Sec. Sch.	49	56	105
12	Onicha Sec. Sch.	1	4	5
13	Udo Sec. Tech Sch.	10	10	20
	Total	471	477	948

SECONDARY SCHOOLS ENROLMENT - IMO STATE

2014/2015

SSS

	OWERRIZONE Ngor Okpala		M	F	Total	M	F	Total
1	Amaka-Ntu Sec. Sch.					147	116	263
2	Comm. Sec. Sch Mbato					49	61	110
3	Compr. Sec. Sch. Umuekwune					58	70	128
4	Imerienwe Girls Sec. Ch. Ngor Okpala					-	80	80
5	Logara Sec. Sch.					52	58	110
6	Ngor-Okpala High Sch.					110	90	200
7	Nguru-Umaro Sec. Sch.					56	41	97
8	Obiangwu Sec. Comm. Sch.					43	47	90
9	Orisheze Comm. Sec. Sch. Orisheze					120	112	231
10	Owari Gramma Sch. Imerienwe					170	89	259
11	Umuhu Compr. Sec. Sch.					49	55	104
12	Umuhiagu Sec. Sch.	Total				899	864	1763

Appendix 4: Sampled schools and their population

s/no	Sample Schools	Number of SS 3 students
1	Technical College Orlu	
2	Ebeneator Ekwe Secondary School Okwuato Orlu	30
3	Comprehensive Secondary School, Okwuato Orlu	19
4	Our Saviour Secondary School, Orlu	17
5	Township Comprehensive Secondary School, Amaifeke	25
6	Girls Secondary School, Awo - Idemili	21
7	Obodoukwu Secondary Technical School	25
8	Umueshi Secondary School	20
9	Isu Girls Secondary Abba	26
10	Nkwere High School	39
11	Ahiazu Secondary School, Lude	38
12	Emmanuel College, Owerr	47
13	Ikenegbu Girls Secondary School	59
14	Government College, Owerri	70
15	Girls Secondary School, Ubomiri	40
16	Amakohia Comprehensive Secondary School	37
17	Afara Secondary School	32
18	Ihagwa Secondary School	48
19	Eziudo Girls High School	25
20	Umuohiagu Secondary School	27
21	Umukwo Girls Secondary School	30
22	Anara Secondary School	32

23	Osu Technical College	61
24	Amaraku Secondary School	42
25	Madonna Secondary School, Etiti	52
26	Abueke Comprehensive Secondary School	65
27	Girls Secondary School, Ihube	27
28	Umuariam Secondary Technical School	33
29	Comprehensive Secondary School, Umunakanu	24
30	Umulolo High School	16
	Total	1051

Appendix 5: Keys of WAEC Question papers from 2011 to 2014

S/NO	2011	2012	2013	2014
1	B	A	C	B
2	D	D	B	A
3	D	B	D	C
4	C	C	D	C
5	A	C	C	B
6	B	A	D	A
7	A	D	B	D
8	A	A	B	B
9	A	C	C	C
10	C	B	D	A
11	B	D	C	C
12	B	B	A	D
13	A	D	A	D
14	A	C	D	A
15	B	A	A	B
16	D	B	B	B
17	D	A	A	D
18	C	C	B	A
19	A	C	C	A
20	D	B	D	C
21	C	A	D	B
22	A	C	D	B
23	B	C	B	B
24	B	D	C	B
25	B	B	C	A

26	C	B	B	D
27	A	C	D	C
28	B	A	C	C
29	A	C	C	A
30	D	C	A	C
31	B	A	C	C
32	C	D	B	D
33	A	C	A	C
34	A	D	D	C
35	B	D	D	C
36	C	B	A	D
37	A	D	A	A
38	D	A	B	C
39	A	A	D	A
40	C	B	C	C
41	D	A	A	B
42	A	C	B	C
43	D	B	B	C
44	A	D	A	A
45	C	C	B	B
46	B	A	B	C
47	D	D	C	D
48	B	B	C	D
49	B	D	D	C
50	C	A	A	A

Appendix 6: Keys of NECO Question papers from 2011 to 2014

S/NO	2011	2012	2013	2014
1	B	D	D	B
2	C	C	A	E
3	A	B	A	B
4	B	B	E	D
5	C	C	E	B
6	A	C	D	E
7	D	C	E	D
8	D	B	B	E
9	A	E	C	D
10	A	C	B	C
11	D	C	B	E
12	D	C	D	C
13	A	C	C	D
14	A	D	E	E
15	C	B	D	B
16	D	E	A	B
17	B	E		D
18	A	E	A	B
19	C	D	D	D
20	A	E	C	B
21	A	E	C	A
22	B	D	B	B
23	A	A	E	A
24	A	A	A	D
25	C	A	D	C
26	E	A	B	E
27	C	A	A	B
28	A	A	B	A
29	D	B	B	E
30	B	D	B	D

31	B	C	D	A
32	C	C	B	E
33	A	A	B	B
34	E	D	C	C
35	B	D	C	D
36	E	A	B	A
37	B	D	E	E
38	B	A	B	D
39	C	C	B	A
40	D	D	D	B
41	E	B	E	D
42	D	B	B	A
43	E	D	D	B
44	D	B	B	B
45	D	B	D	E
46	C	B	D	E
47	D	E	C	B
48	D	B	D	B
49	B	B	B	C
50	A	C	B	C
51	C	A	C	C
52	A	D	C	B
53	D	C	E	B
54	C	E	E	A
55	E	B	B	E
56	D	A	E	B
57	D	D	D	A
58	E	C	C	B
59	A	C	B	E
60	B	A	B	E

APPENDIX 7: Factor analysis of NECO Mathematics test of year 2011

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.978	11.630	11.630	6.978	11.630	11.630
2	3.003	5.005	16.635			
3	2.394	3.990	20.624			
4	2.153	3.588	24.213			
5	1.907	3.178	27.391			
6	1.840	3.067	30.458			
7	1.683	2.804	33.262			
8	1.595	2.658	35.920			
9	1.557	2.595	38.515			
10	1.414	2.357	40.873			
11	1.355	2.259	43.131			
12	1.297	2.162	45.293			
13	1.230	2.050	47.343			
14	1.189	1.982	49.325			
15	1.179	1.965	51.290			
16	1.131	1.885	53.174			
17	1.105	1.842	55.017			
18	1.056	1.760	56.777			
19	1.005	1.675	58.451			
20	.982	1.637	60.089			
21	.962	1.603	61.692			
22	.928	1.547	63.239			
23	.900	1.500	64.739			
24	.882	1.470	66.209			
25	.866	1.443	67.653			
26	.853	1.422	69.075			
27	.817	1.362	70.436			
28	.796	1.327	71.763			
29	.778	1.297	73.060			
30	.771	1.285	74.346			
31	.726	1.210	75.556			
32	.696	1.161	76.716			
33	.690	1.150	77.866			
34	.684	1.140	79.006			

35	.669	1.116	80.122			
36	.640	1.067	81.189			
37	.623	1.039	82.228			
38	.609	1.015	83.243			
39	.601	1.002	84.245			
40	.583	.971	85.216			
41	.569	.948	86.164			
42	.557	.929	87.093			
43	.544	.906	88.000			
44	.538	.897	88.896			
45	.524	.873	89.769			
46	.506	.844	90.613			
47	.497	.829	91.441			
48	.474	.790	92.232			
49	.462	.770	93.001			
50	.454	.757	93.758			
51	.439	.732	94.490			
52	.429	.715	95.205			
53	.420	.699	95.905			
54	.403	.671	96.576			
55	.395	.659	97.235			
56	.372	.619	97.854			
57	.368	.613	98.467			
58	.337	.562	99.029			
59	.297	.495	99.524			
60	.285	.476	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of NECO Mathematics test of year 2012

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.355	18.925	18.925	11.355	18.925	18.925
2	3.155	5.259	24.183			
3	2.649	4.415	28.598			
4	2.452	4.086	32.684			
5	2.091	3.485	36.170			
6	1.847	3.078	39.248			
7	1.659	2.765	42.013			
8	1.457	2.429	44.441			
9	1.413	2.354	46.796			
10	1.331	2.219	49.014			
11	1.296	2.159	51.174			
12	1.253	2.089	53.262			
13	1.228	2.046	55.308			
14	1.135	1.892	57.200			
15	1.099	1.832	59.032			
16	.957	1.596	60.628			
17	.938	1.563	62.190			
18	.915	1.525	63.715			
19	.898	1.497	65.212			
20	.877	1.462	66.674			
21	.835	1.392	68.066			
22	.817	1.362	69.428			
23	.778	1.296	70.724			
24	.762	1.270	71.994			
25	.715	1.192	73.186			
26	.693	1.155	74.341			
27	.685	1.142	75.483			
28	.674	1.124	76.606			
29	.656	1.093	77.700			
30	.619	1.031	78.731			
31	.606	1.010	79.741			
32	.594	.990	80.731			
33	.569	.948	81.680			
34	.566	.944	82.623			

35	.556	.927	83.551			
36	.550	.917	84.467			
37	.525	.874	85.341			
38	.515	.858	86.199			
39	.493	.821	87.020			
40	.490	.816	87.837			
41	.476	.793	88.630			
42	.466	.777	89.407			
43	.444	.740	90.146			
44	.431	.719	90.865			
45	.421	.702	91.567			
46	.413	.689	92.256			
47	.400	.667	92.923			
48	.397	.662	93.585			
49	.381	.635	94.220			
50	.365	.608	94.829			
51	.363	.604	95.433			
52	.349	.582	96.015			
53	.345	.575	96.590			
54	.325	.542	97.132			
55	.322	.536	97.668			
56	.310	.516	98.184			
57	.302	.504	98.688			
58	.275	.459	99.147			
59	.272	.454	99.600			
60	.240	.400	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of NECO Mathematics test of year 2013

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.093	10.155	10.155	6.093	10.155	10.155
2	3.297	5.495	15.650			
3	2.686	4.476	20.126			
4	2.255	3.758	23.884			
5	1.896	3.160	27.044			
6	1.793	2.988	30.032			
7	1.685	2.809	32.840			
8	1.639	2.732	35.572			

9	1.551	2.584	38.156			
10	1.463	2.438	40.594			
11	1.394	2.323	42.917			
12	1.352	2.253	45.171			
13	1.260	2.099	47.270			
14	1.189	1.981	49.251			
15	1.149	1.915	51.166			
16	1.125	1.876	53.041			
17	1.084	1.807	54.848			
18	1.061	1.769	56.617			
19	1.036	1.727	58.345			
20	.977	1.628	59.973			
21	.970	1.616	61.589			
22	.946	1.577	63.166			
23	.918	1.529	64.695			
24	.901	1.501	66.196			
25	.864	1.440	67.636			
26	.838	1.397	69.033			
27	.818	1.363	70.396			
28	.811	1.351	71.747			
29	.768	1.280	73.027			
30	.756	1.260	74.287			
31	.738	1.230	75.517			
32	.722	1.204	76.721			
33	.701	1.168	77.889			
34	.685	1.141	79.030			
35	.667	1.112	80.141			
36	.636	1.060	81.202			
37	.634	1.056	82.258			
38	.616	1.027	83.285			
39	.607	1.012	84.298			
40	.594	.989	85.287			
41	.580	.966	86.253			
42	.551	.919	87.171			
43	.539	.899	88.070			
44	.530	.883	88.953			
45	.524	.873	89.826			
46	.500	.833	90.659			
47	.497	.828	91.486			

48	.476	.794	92.280			
49	.472	.787	93.067			
50	.456	.761	93.827			
51	.430	.717	94.545			
52	.422	.704	95.249			
53	.409	.682	95.930			
54	.406	.677	96.607			
55	.391	.651	97.259			
56	.366	.611	97.869			
57	.355	.592	98.461			
58	.330	.550	99.011			
59	.321	.534	99.545			
60	.273	.455	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of NECO Mathematics test of year 2014

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.452	22.420	22.420	13.452	22.420	22.420
2	3.914	6.524	28.944			
3	3.136	5.226	34.170			
4	2.568	4.281	38.451			
5	2.083	3.472	41.923			
6	1.968	3.280	45.202			
7	1.547	2.578	47.781			
8	1.484	2.474	50.255			
9	1.290	2.151	52.405			
10	1.254	2.090	54.495			
11	1.212	2.019	56.515			
12	1.200	2.001	58.515			
13	1.069	1.781	60.297			
14	.996	1.660	61.956			
15	.984	1.641	63.597			
16	.916	1.527	65.125			
17	.850	1.416	66.541			
18	.831	1.385	67.926			
19	.799	1.331	69.257			
20	.769	1.282	70.540			
21	.758	1.264	71.804			

22	.727	1.212	73.015			
23	.716	1.193	74.208			
24	.675	1.124	75.332			
25	.662	1.103	76.436			
26	.636	1.060	77.496			
27	.607	1.012	78.508			
28	.591	.985	79.493			
29	.587	.978	80.472			
30	.569	.948	81.420			
31	.529	.882	82.302			
32	.526	.876	83.178			
33	.513	.855	84.033			
34	.501	.835	84.869			
35	.480	.799	85.668			
36	.471	.786	86.454			
37	.460	.767	87.221			
38	.444	.740	87.961			
39	.435	.725	88.686			
40	.434	.723	89.409			
41	.428	.713	90.122			
42	.398	.663	90.786			
43	.393	.654	91.440			
44	.375	.624	92.064			
45	.367	.612	92.677			
46	.362	.603	93.280			
47	.353	.588	93.868			
48	.342	.571	94.438			
49	.340	.567	95.005			
50	.327	.545	95.550			
51	.319	.532	96.082			
52	.306	.510	96.592			
53	.293	.488	97.080			
54	.281	.468	97.548			
55	.274	.456	98.004			
56	.267	.444	98.448			
57	.252	.420	98.868			
58	.242	.403	99.272			
59	.220	.367	99.639			
60	.217	.361	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of WAEC Mathematics test of year 2011

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.914	23.828	23.828	11.914	23.828	23.828
2	2.651	5.302	29.131			
3	2.345	4.691	33.822			
4	1.975	3.950	37.771			
5	1.638	3.276	41.047			
6	1.503	3.006	44.054			
7	1.414	2.828	46.882			
8	1.376	2.752	49.634			
9	1.272	2.543	52.177			
10	1.162	2.324	54.501			
11	1.123	2.246	56.748			
12	1.033	2.066	58.814			
13	.988	1.977	60.790			
14	.895	1.789	62.579			
15	.858	1.716	64.296			
16	.847	1.693	65.989			
17	.821	1.642	67.631			
18	.798	1.596	69.227			
19	.788	1.576	70.803			
20	.744	1.488	72.291			
21	.692	1.383	73.674			
22	.682	1.364	75.038			
23	.664	1.328	76.366			
24	.646	1.292	77.659			
25	.623	1.246	78.905			
26	.608	1.216	80.121			
27	.588	1.175	81.296			
28	.577	1.154	82.450			
29	.554	1.108	83.558			
30	.533	1.066	84.624			
31	.527	1.053	85.677			
32	.502	1.004	86.681			
33	.468	.936	87.617			
34	.460	.921	88.538			

35	.448	.896	89.434			
36	.446	.893	90.327			
37	.422	.844	91.171			
38	.416	.831	92.002			
39	.408	.816	92.819			
40	.389	.779	93.598			
41	.375	.749	94.347			
42	.354	.709	95.056			
43	.347	.695	95.750			
44	.338	.676	96.426			
45	.321	.641	97.068			
46	.317	.633	97.701			
47	.308	.616	98.317			
48	.293	.585	98.902			
49	.279	.559	99.461			
50	.269	.539	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of WAEC Mathematics test of year 2012

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.307	20.615	20.615	10.307	20.615	20.615
2	2.981	5.962	26.577			
3	2.706	5.413	31.990			
4	2.291	4.582	36.572			
5	1.993	3.985	40.557			
6	1.655	3.311	43.868			
7	1.393	2.785	46.653			
8	1.327	2.654	49.307			
9	1.212	2.424	51.731			
10	1.185	2.369	54.100			
11	1.096	2.191	56.291			
12	1.066	2.132	58.424			
13	.948	1.896	60.320			
14	.936	1.872	62.192			
15	.887	1.775	63.967			
16	.835	1.670	65.637			
17	.789	1.577	67.214			

18	.780	1.559	68.774			
19	.764	1.527	70.301			
20	.739	1.477	71.779			
21	.716	1.432	73.210			
22	.690	1.380	74.590			
23	.658	1.316	75.906			
24	.639	1.279	77.185			
25	.631	1.261	78.446			
26	.616	1.233	79.678			
27	.584	1.169	80.847			
28	.580	1.160	82.008			
29	.567	1.134	83.142			
30	.542	1.083	84.225			
31	.524	1.048	85.273			
32	.514	1.028	86.301			
33	.493	.986	87.287			
34	.487	.974	88.261			
35	.475	.951	89.212			
36	.440	.880	90.092			
37	.438	.875	90.967			
38	.424	.848	91.816			
39	.408	.816	92.632			
40	.404	.808	93.439			
41	.388	.775	94.215			
42	.364	.729	94.944			
43	.363	.727	95.671			
44	.351	.702	96.373			
45	.327	.654	97.026			
46	.318	.637	97.663			
47	.308	.615	98.278			
48	.306	.612	98.891			
49	.294	.588	99.479			
50	.261	.521	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of WAEC Mathematics test of year 2013

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %

1	10.289	20.577	20.577	10.289	20.577	20.577
2	3.125	6.249	26.827			
3	2.816	5.632	32.459			
4	2.327	4.654	37.112			
5	1.843	3.686	40.798			
6	1.451	2.901	43.700			
7	1.351	2.702	46.402			
8	1.303	2.606	49.007			
9	1.242	2.484	51.492			
10	1.180	2.360	53.852			
11	1.085	2.170	56.022			
12	1.047	2.093	58.116			
13	1.001	2.001	60.117			
14	.957	1.915	62.032			
15	.919	1.838	63.869			
16	.876	1.752	65.621			
17	.839	1.678	67.298			
18	.800	1.600	68.899			
19	.777	1.553	70.452			
20	.744	1.488	71.941			
21	.716	1.432	73.372			
22	.686	1.372	74.744			
23	.660	1.319	76.063			
24	.637	1.274	77.337			
25	.630	1.260	78.598			
26	.609	1.217	79.815			
27	.599	1.197	81.012			
28	.572	1.144	82.156			
29	.559	1.118	83.274			
30	.550	1.100	84.374			
31	.534	1.068	85.441			
32	.519	1.037	86.479			
33	.491	.981	87.460			
34	.471	.943	88.403			
35	.454	.908	89.311			
36	.453	.906	90.216			
37	.429	.859	91.075			
38	.421	.842	91.916			
39	.401	.802	92.719			
40	.385	.771	93.489			

41	.382	.765	94.254			
42	.367	.734	94.988			
43	.365	.729	95.718			
44	.341	.683	96.400			
45	.337	.675	97.075			
46	.328	.657	97.732			
47	.316	.631	98.363			
48	.287	.574	98.937			
49	.268	.536	99.473			
50	.264	.527	100.000			

Extraction Method: Principal Component Analysis.

Factor analysis of WAEC Mathematics test of year 2014

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.415	20.830	20.830	10.415	20.830	20.830
2	2.911	5.821	26.652			
3	2.532	5.065	31.717			
4	1.981	3.962	35.678			
5	1.812	3.623	39.302			
6	1.609	3.218	42.519			
7	1.550	3.100	45.619			
8	1.407	2.814	48.433			
9	1.389	2.778	51.211			
10	1.258	2.517	53.728			
11	1.214	2.428	56.156			
12	1.127	2.254	58.410			
13	1.025	2.051	60.461			
14	.962	1.925	62.386			
15	.941	1.881	64.267			
16	.877	1.753	66.020			
17	.857	1.713	67.734			
18	.829	1.659	69.392			
19	.809	1.618	71.010			
20	.746	1.493	72.503			
21	.724	1.447	73.951			
22	.685	1.369	75.320			

23	.670	1.340	76.659			
24	.653	1.305	77.965			
25	.630	1.261	79.225			
26	.608	1.217	80.442			
27	.588	1.176	81.618			
28	.575	1.149	82.767			
29	.548	1.096	83.863			
30	.529	1.059	84.922			
31	.521	1.041	85.963			
32	.511	1.021	86.984			
33	.493	.986	87.970			
34	.465	.929	88.900			
35	.450	.901	89.800			
36	.429	.859	90.659			
37	.416	.832	91.491			
38	.413	.825	92.316			
39	.403	.806	93.122			
40	.381	.762	93.885			
41	.377	.754	94.639			
42	.354	.708	95.346			
43	.342	.683	96.029			
44	.324	.649	96.678			
45	.316	.632	97.310			
46	.304	.609	97.918			
47	.284	.567	98.486			
48	.269	.537	99.023			
49	.255	.510	99.533			
50	.233	.467	100.000			

Extraction Method: Principal Component Analysis.

Appendix 8: distribution of abilities scores of examinee on NECO and WAEC Mathematics test

Year			2011				2012				2013		$Tr\ x_N$		2014	
S/N	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$	NECO	$Tr\ x_N$	WAEC	$Tr\ x_W$	NECO		WAEC	$Tr\ x_W$
1	0.66	-0.46	-0.46	0.71	0.43	0.97	0.9	0.38	0.59	0.41	0.46	0.64	0.91	0.45	0.43	1.93
2	0.89	-0.91	-0.93	0.95	0.58	1.15	1.08	0.52	0.64	0.39	0.43	0.7	1.1	1.63	1.68	2.12
3	-0.41	0.23	0.27	-0.42	0.94	0.65	0.59	0.87	0.56	0.55	0.62	0.61	0.5	1.26	1.29	1.52
4	0.38	0.26	0.31	0.41	0.38	0.87	0.81	0.33	0.91	0.38	0.42	1.01	0.86	1.14	1.16	1.88
5	0.28	0.18	0.22	0.31	0.77	-0.05	-0.09	0.71	0.76	0.06	0.06	0.84	0.87	0.41	0.39	1.89
6	0.38	-0.06	-0.03	0.41	0.65	0.98	0.91	0.59	0.97	0.56	0.63	1.08	-1.56	0.03	-0.01	-0.54
7	0.99	0.27	0.32	1.06	0.63	0.98	0.91	0.57	0.6	0.32	0.35	0.66	1.16	1	1.01	2.18
8	0.62	0.63	0.7	0.67	0.75	1.12	1.05	0.69	0.45	0.52	0.58	0.48	1.47	1.5	1.54	2.49
9	-0.13	0.26	0.31	-0.13	0.46	-0.36	-0.39	0.41	-1.25	0.6	0.68	-1.46	0.89	0.98	0.99	1.91
10	-0.13	0.35	0.4	-0.13	0.78	1.03	0.96	0.72	0.53	0.5	0.56	0.58	-1.42	1.5	1.54	-0.4
11	0.66	0.56	0.62	0.71	0.32	1.06	0.99	0.27	-1.29	0.52	0.58	-1.51	0.76	0.44	0.42	1.78
12	0.68	1.27	1.38	0.73	1.16	0.69	0.63	1.09	0.27	1.22	1.39	0.28	-1.74	1.56	1.61	-0.72
13	0.68	1.27	1.38	0.73	1.14	0.69	0.63	1.07	0.27	0.83	0.94	0.28	-1.38	1.38	1.42	-0.36
14	0.68	0.98	1.07	0.73	1.22	0.72	0.66	1.15	0.33	1.18	1.34	0.35	-1.17	1.18	1.2	-0.15
15	0.74	1.27	1.38	0.79	1.16	0.69	0.63	1.09	0.27	1.22	1.39	0.28	-1.61	1.56	1.61	-0.59
16	0.68	1.27	1.38	0.73	1.22	0.69	0.63	1.15	0.27	1.22	1.39	0.28	-0.75	1.07	1.09	0.27
17	0.81	1.27	1.38	0.87	0.37	0.78	0.72	0.32	-0.66	0.89	1.01	-0.79	-1.56	0.93	0.94	-0.54
18	-0.91	1.27	1.38	-0.95	-1.96	0.65	0.59	-1.95	0.99	0.85	0.96	1.1	1.08	0.86	0.87	2.1
19	0.68	0.82	0.9	0.73	1.22	0.69	0.63	1.15	0.27	-0.72	-0.84	0.28	-1.1	1.19	1.21	-0.08
20	0.68	1.14	1.24	0.73	1.22	0.63	0.57	1.15	0.27	-0.75	-0.87	0.28	-1.34	0.78	0.78	-0.32

21	0.68	1.35	1.46	0.73	1.22	0.69	0.63	1.15	0.2	1.22	1.39	0.2	-1.56	1.07	1.09	-0.54
22	0.68	1.27	1.38	0.73	1.16	0.69	0.63	1.09	0.27	1.22	1.39	0.28	-1.56	1.32	1.35	-0.54
23	0.78	-0.87	-0.89	0.84	-1.9	-0.24	-0.27	-1.89	-1.3	0.03	0.02	-1.52	-1.53	1.44	1.48	-0.51
24	1.14	-0.87	-0.89	1.22	-2.34	-0.13	-0.17	-2.31	-1.3	0.03	0.02	-1.52	-1.53	1.44	1.48	-0.51
	1.71	-0.74	-0.75	1.82	-1.91	-0.04	-0.08	-1.9	-1.3	0.09	0.09	-1.52	-1.44	0.83	0.83	-0.42
	1.14	-0.87	-0.89	1.22	-1.91	-0.13	-0.17	-1.9	-1.3	0.04	0.04	-1.52	-1.44	1.44	1.48	-0.42
	1.14	-0.87	-0.89	1.22	-0.28	-0.26	-0.29	-0.31	-1.28	-0.01	-0.02	-1.49	-1.53	1.44	1.48	-0.51
	1.14	-0.87	-0.89	1.22	-1.88	-0.08	-0.12	-1.87	-1.3	0.03	0.02	-1.52	-1.56	1.44	1.48	-0.54
	1.66	-0.98	-1.01	1.77	-2.05	-0.27	-0.3	-2.03	-1.22	0.21	0.23	-1.43	-1.17	1.56	1.61	-0.15
	1.71	-0.98	-1.01	1.82	-1.96	-0.01	-0.05	-1.95	-1.3	0.09	0.09	-1.52	-1.37	-1.03	-1.13	-0.35
	1.34	2.09	2.24	1.43	-1.96	-0.04	-0.08	-1.95	-1.3	0.07	0.07	-1.52	-1.39	0.96	0.97	-0.37
	0.52	-1.11	-1.14	0.56	-1.76	-0.16	-0.19	-1.75	-1.15	0.23	0.25	-1.35	-1.53	0.64	0.63	-0.51
	1.48	-0.98	-1.01	1.58	-1.96	-0.16	-0.19	-1.95	-1.35	0.18	0.19	-1.57	-1.53	0.64	0.63	-0.51
	-0.03	-0.87	-0.89	-0.02	-0.87	-0.16	-0.19	-0.89	-1.25	0.03	0.02	-1.46	-1.17	-0.68	-0.76	-0.15
	0.44	-0.8	-0.82	0.48	-1.96	-0.3	-0.33	-1.95	-1.3	0.16	0.17	-1.52	-1.24	-1.16	-1.27	-0.22
	0.82	-0.63	-0.64	0.88	-1.98	-0.13	-0.17	-1.96	-1.25	-0.43	-0.5	-1.46	-0.39	-1.18	-1.29	0.63
	-0.69	-0.82	-0.84	-0.72	-0.24	1.21	1.14	-0.27	-1.25	0.75	0.85	-1.46	-1.53	1.14	1.16	-0.51
	-1.2	-1.54	-1.6	-1.26	-0.78	0.85	0.79	-0.8	-0.69	1.22	1.39	-0.82	-1.36	1.15	1.17	-0.34
	-0.55	-0.98	-1.01	-0.57	-1.13	0.03	-0.01	-1.14	1.08	-0.2	-0.24	1.21	-1.11	0.79	0.79	-0.09
	1.14	-0.87	-0.89	1.22	-2.08	-0.04	-0.08	-2.06	-1.3	0.03	0.02	-1.52	-1.53	1.44	1.48	-0.51
	1.17	-0.94	-0.96	1.25	-2.08	0.01	-0.03	-2.06	-1.35	-0.03	-0.05	-1.57	-1.53	1.44	1.48	-0.51
	0.92	-1.01	-1.04	0.98	-2.08	-0.04	-0.08	-2.06	-1.33	-0.02	-0.04	-1.55	-1.57	1.44	1.48	-0.55
	0.83	-0.98	-1.01	0.89	-2.02	-0.27	-0.3	-2	-1.3	0.18	0.19	-1.52	-1.29	-1.29	-1.4	-0.27
	0.04	-0.91	-0.93	0.05	-2.14	-0.16	-0.19	-2.12	-1.08	-0.07	-0.09	-1.27	-1.44	1.38	1.41	-0.42
	0.78	0.39	0.44	0.84	0.74	0.87	0.81	0.68	1.09	0.65	0.73	1.22	-1.53	0.51	0.5	-0.51

0.82	0.95	1.04	0.88	0.5	0.63	0.57	0.45	0.74	0.5	0.56	0.82	-1.53	0.95	0.96	-0.51
0.44	1.19	1.29	0.48	0.96	0.72	0.66	0.89	1.11	0.66	0.74	1.24	-1.53	1.2	1.23	-0.51
0.17	1.39	1.5	0.19	1	0.69	0.63	0.93	0.82	0.72	0.81	0.91	-1.48	0.36	0.34	-0.46
0.36	1.16	1.26	0.39	0.93	0.61	0.55	0.86	0.71	0.88	1	0.78	-1.32	1	1.01	-0.3
0.93	-0.98	-1.01	0.99	-1.61	1.47	1.39	-1.6	-1.3	-0.53	-0.62	-1.52	-1.09	-1.15	-1.26	-0.07
0.46	-0.98	-1.01	0.5	-1.8	-0.3	-0.33	-1.79	-1.3	0.06	0.06	-1.52	-1.3	1.23	1.26	-0.28
1.71	-0.87	-0.89	1.82	-2.01	-0.3	-0.33	-1.99	-1.3	0.09	0.09	-1.52	-1.45	0.84	0.84	-0.43
-0.35	-0.93	-0.95	-0.36	-1.05	-0.28	-0.31	-1.06	-1.31	-0.11	-0.14	-1.53	-1.03	-1.15	-1.26	-0.01
0.74	-0.93	-0.95	0.79	-2.01	-0.16	-0.19	-1.99	-1.36	-0.08	-0.1	-1.59	-1.04	1.16	1.18	-0.02
0.94	-0.87	-0.89	1	-2.03	-0.2	-0.23	-2.01	-1.3	0.04	0.04	-1.52	-1.04	1.2	1.23	-0.02
0.4	-0.87	-0.89	0.43	-1.72	-0.28	-0.31	-1.71	-0.68	0.08	0.08	-0.81	-1.4	1.41	1.45	-0.38
1.26	0.56	0.62	1.34	0.71	0.94	0.87	0.65	1.39	0.66	0.74	1.56	0.72	1.15	1.17	1.74
-0.15	-0.06	-0.03	-0.15	0.9	0.65	0.59	0.83	0.89	0.52	0.58	0.99	-1.23	1.13	1.15	-0.21
-0.15	-0.98	-1.01	-0.15	-1.96	-0.39	-0.42	-1.95	-1.22	0.09	0.09	-1.43	-1.45	0.36	0.34	-0.43
1.61	-0.98	-1.01	1.71	-2.01	-0.39	-0.42	-1.99	-1.3	-0.12	-0.15	-1.52	-1.17	1.2	1.23	-0.15
0.04	-0.76	-0.77	0.05	-2.46	-0.13	-0.17	-2.43	-1.3	0.03	0.02	-1.52	-1.58	1.44	1.48	-0.56
1.24	-0.57	-0.57	1.32	-1.71	-1.39	-1.39	-1.7	-1.3	0.18	0.19	-1.52	-1.53	1.45	1.49	-0.51
-0.04	3.75	4	-0.03	0.81	0.44	0.39	0.75	0.66	0.41	0.46	0.73	0.87	0.44	0.42	1.89
0.46	3.75	4	0.5	0.48	0.9	0.84	0.43	0.61	0.25	0.27	0.67	0.83	0.01	-0.03	1.85
0.72	0.06	0.1	0.77	0.67	0.4	0.35	0.61	0.72	0.46	0.52	0.79	0.84	0.13	0.09	1.86
0.12	0.38	0.43	0.14	1.14	-0.43	-0.46	1.07	0.59	1.01	1.14	0.64	0.65	1.54	1.58	1.67
0.92	-0.05	-0.02	0.98	-0.11	0.55	0.5	-0.15	0.6	-0.15	-0.18	0.66	0.17	0.21	0.18	1.19
1.21	-0.29	-0.27	1.29	0.16	-1.35	-1.35	0.12	0.82	0.36	0.4	0.91	0.69	0.02	-0.02	1.71
-0.54	-0.59	-0.59	-0.56	4	1.27	1.2	3.85	-0.06	0.5	0.56	-0.1	1.07	-0.11	-0.16	2.09
1.03	0.13	0.17	1.1	2.57	0.7	0.64	2.46	1.01	0.7	0.79	1.13	1.01	0.62	0.61	2.03

-1.23	0.1	0.14	-1.29	2.57	0.44	0.39	2.46	0.46	0.59	0.66	0.5	0.54	0.85	0.86	1.56
0.4	1.05	1.14	0.43	0.36	0.89	0.83	0.31	0.96	0.87	0.98	1.07	1.04	0.99	1	2.06
-0.45	-0.42	-0.41	-0.47	0.25	2.06	1.96	0.2	0.22	0.67	0.76	0.22	1.2	-0.36	-0.42	2.22
0.13	-0.1	-0.07	0.15	2.28	0.87	0.81	2.18	0.85	0.44	0.49	0.94	0.37	0.77	0.77	1.39
0.47	0.19	0.23	0.51	2.57	0.7	0.64	2.46	-0.71	0.26	0.29	-0.84	0.88	0.74	0.74	1.9
-0.35	-0.01	0.02	-0.36	4	0.53	0.48	3.85	0.25	0.14	0.15	0.26	0.17	0.83	0.83	1.19
-0.51	0.07	0.11	-0.53	0.25	0.77	0.71	0.2	0.64	3.22	3.67	0.7	0.92	0.86	0.87	1.94
-0.51	0.1	0.14	-0.53	0.4	0.8	0.74	0.35	0.97	1.96	2.23	1.08	0.69	0.27	0.24	1.71
-1.13	-0.53	-0.53	-1.19	-0.56	-2.95	-2.91	-0.58	-0.21	-1.13	-1.31	-0.27	-0.1	-0.85	-0.94	0.92
0.27	-0.03	0	0.3	0.59	0.63	0.57	0.53	-1.85	0.6	0.68	-2.15	0.4	1.97	2.04	1.42
0.29	0.46	0.52	0.32	-0.12	0.08	0.04	-0.16	0.05	0.3	0.33	0.03	0.88	-1.2	-1.31	1.9
-0.07	0.26	0.31	-0.06	0.55	0.96	0.89	0.49	0.89	1.03	1.17	0.99	1.44	0.72	0.72	2.46
2.14	0.2	0.24	2.27	0.83	0.58	0.52	0.77	0.63	-0.44	-0.51	0.69	0.75	0.39	0.37	1.77
-0.17	0.15	0.19	-0.17	0.52	0.28	0.23	0.47	0.04	0.39	0.43	0.02	0.12	0.58	0.57	1.14
0.09	0	0.03	0.11	0.35	0.6	0.54	0.3	0.58	0.47	0.53	0.63	0.93	3.23	3.37	1.95
2.14	0.26	0.31	2.27	0.47	0.59	0.53	0.42	0.9	0.25	0.27	1	1.08	0.22	0.19	2.1
0.53	-0.1	-0.07	0.57	0.07	2.06	1.96	0.03	-0.18	0.74	0.83	-0.24	0.7	-0.94	-1.03	1.72
-0.38	-0.2	-0.18	-0.39	0.23	2.51	2.4	0.18	0.07	0.67	0.76	0.05	0.63	0.34	0.32	1.65
-0.51	0.07	0.11	-0.53	0.25	0.77	0.71	0.2	0.61	-0.01	-0.02	0.67	0.46	0.85	0.86	1.48
2.14	0.22	0.26	2.27	0.37	0.08	0.04	0.32	-1.4	0.18	0.2	-1.63	0.47	0.22	0.19	1.49
0.17	0.66	0.73	0.19	0.66	0.67	0.61	0.6	0.38	1.36	1.54	0.4	0.25	0.24	0.21	1.27
0.77	0.74	0.82	0.82	0.7	0.56	0.51	0.64	-1.9	0.96	1.09	-2.2	1.48	0.35	0.33	2.5
0.12	0.47	0.53	0.14	0.67	0.62	0.56	0.61	0.62	0.88	1	0.68	1.48	0.9	0.91	2.5
-0.26	0.13	0.17	-0.27	0.73	0.47	0.42	0.67	0.31	0.77	0.87	0.32	1.35	0.83	0.83	2.37
0.7	0.54	0.6	0.75	0.76	0.91	0.85	0.7	1.24	0.76	0.86	1.39	1.37	0.71	0.71	2.39

-0.3	0.15	0.19	-0.31	0.32	0.44	0.39	0.27	0.58	0.46	0.51	0.63	1.8	0.5	0.49	2.82
-0.14	0.25	0.3	-0.14	0.54	0.41	0.36	0.48	0.67	0.46	0.51	0.74	1.05	3.23	3.37	2.07
0.71	0.25	0.3	0.76	-0.1	0.42	0.37	-0.14	0.68	3.22	3.67	0.75	0.59	0.48	0.46	1.61
2.14	0.57	0.64	2.27	0.29	-0.13	-0.17	0.24	0.61	0.04	0.03	0.67	0.63	0.28	0.25	1.65
0.28	0.05	0.08	0.31	0.45	0.3	0.25	0.4	0.58	0.29	0.32	0.63	0.8	3.23	3.37	1.82
0.22	0.07	0.11	0.24	-0.25	-0.43	-0.46	-0.28	0.69	0.56	0.63	0.76	0.55	0.22	0.19	1.57
1.02	0.62	0.69	1.09	0.31	0.84	0.78	0.26	1.86	0.76	0.86	2.1	0.84	0.95	0.96	1.86
0.68	1.27	1.38	0.73	1.22	0.69	0.63	1.15	1.86	1.22	1.39	2.1	-1.53	0.97	0.98	-0.51
1.12	3.75	4	1.19	0.47	0.7	0.64	0.42	0.87	0.87	0.98	0.97	1.02	0.5	0.49	2.04
0.79	1.17	1.27	0.85	1.07	1.15	1.08	1	1.04	0.83	0.94	1.16	1.02	1.03	1.05	2.04
-0.99	-1.07	-1.1	-1.04	0.69	-1.6	-1.59	0.63	0.15	-1.12	-1.29	0.14	-0.7	-3.75	-4	0.32
-1.27	-1.42	-1.47	-1.33	-0.48	-2.53	-2.5	-0.51	0.42	-0.65	-0.76	0.45	-0.15	-2.55	-2.74	0.87
-0.32	-1.96	-2.04	-0.33	-1.86	-1.19	-1.2	-1.85	0.32	-2.13	-2.45	0.34	-0.23	-0.54	-0.61	0.79
-0.05	-1.39	-1.44	-0.04	-1	-1.51	-1.51	-1.01	-0.33	-1.28	-1.48	-0.41	-0.2	-1.2	-1.31	0.82
-1.06	-1.44	-1.49	-1.11	-0.7	-1.37	-1.37	-0.72	0	-0.93	-1.08	-0.03	-0.13	-1.17	-1.28	0.89
2.24	1.95	2.09	2.38	4	1.34	1.26	3.85	1.86	0.78	0.88	2.1	1.2	0.61	0.6	2.22
1.08	1.05	1.14	1.15	0.48	-0.2	-0.23	0.43	1.86	0.6	0.68	2.1	1.17	0.43	0.41	2.19
-0.56	1.4	1.51	-0.58	1.79	0.1	0.06	1.7	1.88	-0.86	-1	2.12	1.67	0.74	0.74	2.69
-0.96	-0.96	-0.98	-1.01	-0.54	-1.25	-1.25	-0.56	0.64	-0.09	-0.12	0.7	-0.92	-0.22	-0.27	0.1
-0.56	1.27	1.38	-0.58	1.05	0.1	0.06	0.98	1.88	-0.86	-1	2.12	1.57	0.74	0.74	2.59
0.32	3.75	4	0.35	0.22	0.74	0.68	0.17	0.17	0.8	0.9	0.16	0.6	0.33	0.31	1.62
-0.59	3.75	4	-0.61	0.39	-1.07	-1.08	0.34	0.65	0.77	0.87	0.71	0.98	0.68	0.68	2
0.03	-0.06	-0.03	0.04	-0.01	2.63	2.52	-0.05	0.6	-0.04	-0.06	0.66	0.47	0.59	0.58	1.49
0.17	0.08	0.12	0.19	0.29	2.93	2.81	0.24	1.07	-1.09	-1.26	1.19	0.74	0.13	0.1	1.76
-0.19	0.52	0.58	-0.19	0.33	2.93	2.81	0.28	0.7	0.37	0.41	0.77	0.13	-0.13	-0.18	1.15

0.03	2.38	2.55	0.04	0.17	0.08	0.04	0.13	0.66	-0.37	-0.43	0.73	0.49	0.11	0.07	1.51
-0.12	2.69	2.88	-0.12	0.24	0.49	0.44	0.19	0.48	0.44	0.49	0.52	0.84	0.38	0.36	1.86
0.56	0.57	0.64	0.6	0.44	0.56	0.51	0.39	1.86	0.28	0.31	2.1	0.89	0.36	0.34	1.91
0.26	3.18	3.4	0.29	0.42	1.05	0.98	0.37	0.71	0.11	0.12	0.78	0.35	-0.29	-0.35	1.37
-0.2	3.75	4	-0.2	0.76	0.8	0.74	0.7	0.89	-0.12	-0.15	0.99	0.81	0.06	0.02	1.83
0.47	3.75	4	0.51	0.72	0.52	0.47	0.66	0.5	-0.07	-0.09	0.54	0.49	0.12	0.08	1.51
0.92	0.92	1.01	0.98	1.25	0.67	0.61	1.18	1.11	0.95	1.08	1.24	1.17	0.86	0.87	2.19
2.14	-0.03	0	2.27	0.81	0.46	0.41	0.75	0.49	0.22	0.24	0.53	1.01	0.06	0.02	2.03
2.14	0.36	0.41	2.27	0.3	0.69	0.63	0.25	1.01	0.32	0.36	1.13	0.45	0.15	0.12	1.47
-0.16	0.28	0.33	-0.16	-0.8	0.66	0.6	-0.82	0.19	0.8	0.9	0.19	-0.56	0.26	0.23	0.46
0.56	0.44	0.5	0.6	2.18	0.92	0.86	2.08	1.87	0.88	0.99	2.11	-0.34	1.55	1.59	0.68
-1.85	-0.97	-0.99	-1.95	-0.56	-1.3	-1.3	-0.58	-0.96	-1.13	-1.3	-1.13	-0.91	-1.83	-1.97	0.11
-1.58	-0.51	-0.51	-1.66	-0.67	-1.54	-1.54	-0.69	-1.53	-1.82	-2.09	-1.78	-0.41	-1.3	-1.41	0.61
-1.21	-0.92	-0.94	-1.27	-0.11	-2.51	-2.48	-0.15	-1.74	-1.19	-1.37	-2.02	-0.53	-2.07	-2.23	0.49
-1.9	-0.52	-0.52	-2	-0.81	-0.47	-0.5	-0.83	-1.58	-1.13	-1.31	-1.84	-0.28	-0.81	-0.9	0.74
2.14	3.75	4	2.27	4	2.93	2.81	3.85	1.86	3.22	3.67	2.1	0.28	0.8	0.8	1.3
1.01	0.53	0.59	1.08	0.5	0.95	0.88	0.45	0.73	0.51	0.57	0.81	0.56	0.21	0.18	1.58
0.63	-1.36	-1.41	0.68	1.07	-1.11	-1.12	1	0.89	-1.08	-1.25	0.99	1.69	-1.75	-1.89	2.71
2.14	3.75	4	2.27	2.16	2.93	2.81	2.06	1.86	1.85	2.11	2.1	2.37	2.36	2.45	3.39
2.14	3.75	4	2.27	1.09	2.93	2.81	1.02	1.67	1.25	1.42	1.88	1.19	3.4	3.55	2.21
1.41	0.56	0.62	1.5	0.84	0.58	0.52	0.78	0.99	1.02	1.15	1.1	0.98	0.77	0.77	2
1.22	0.91	0.99	1.3	0.66	1.23	1.16	0.6	1.15	0.93	1.05	1.29	0.81	0.81	0.81	1.83
0.43	1.41	1.52	0.46	1	2.16	2.06	0.93	1.57	0.82	0.93	1.77	0.85	0.67	0.66	1.87
2.14	3.75	4	2.27	4	2.93	2.81	3.85	1.86	1.13	1.28	2.1	3.73	3.4	3.55	4.75
-0.08	3.3	3.52	-0.07	-0.44	2.93	2.81	-0.47	1.32	3.22	3.67	1.48	1.41	3.4	3.55	2.43

0.68	0.66	0.73	0.73	0.91	1.01	0.94	0.84	1	0.9	1.02	1.11	0.68	0.75	0.75	1.7
1.34	3.44	3.67	1.43	0.93	0.86	0.8	0.86	1.67	2.26	2.57	1.88	0.62	-1.2	-1.31	1.64
1.15	0.23	0.27	1.23	0.27	0.76	0.7	0.22	-1.37	0.67	0.76	-1.6	0.94	1.27	1.3	1.96
-0.48	-0.77	-0.78	-0.5	-0.39	-1.14	-1.15	-0.42	-0.26	-2.48	-2.85	-0.33	-0.32	-1.05	-1.15	0.7
1.06	2.14	2.3	1.13	1.03	2.17	2.07	0.96	1.7	0.88	1	1.91	0.63	1.4	1.44	1.65
2.14	1.9	2.04	2.27	1.2	-1.39	-1.39	1.13	1.67	3.22	3.67	1.88	-1.53	3.4	3.55	-0.51
0.48	-0.1	-0.07	0.52	1.06	1.42	1.34	0.99	0.9	-0.25	-0.3	1	0.79	0.31	0.28	1.81
0.09	-0.91	-0.93	0.11	-0.68	-0.03	-0.07	-0.7	0.4	1.01	1.14	0.43	0.98	0.7	0.7	2
-1.87	-0.65	-0.66	-1.97	-0.43	-0.88	-0.89	-0.46	-1.76	-1.12	-1.29	-2.04	-0.69	-1.3	-1.41	0.33
-1.36	-0.84	-0.86	-1.43	-0.44	-1.26	-1.26	-0.47	-1.71	-1.13	-1.3	-1.99	-0.47	-0.81	-0.9	0.55
-2.01	-0.8	-0.82	-2.12	-0.53	-0.73	-0.75	-0.56	-1.26	-0.79	-0.91	-1.47	-0.53	-1.34	-1.46	0.49
-0.02	3.15	3.37	-0.01	1.7	0.99	0.92	1.61	1.98	3.22	3.67	2.24	0.37	0.41	0.39	1.39
1.7	-0.37	-0.36	1.81	0.71	0.81	0.75	0.65	1.67	0.79	0.89	1.88	3.73	0.72	0.72	4.75
0	0.74	0.81	0.01	0.77	0.97	0.9	0.71	1.02	0.61	0.69	1.14	1.45	0.45	0.43	2.47
2.14	3.75	4	2.27	4	2.72	2.6	3.85	1.73	0.95	1.08	1.95	0.18	0.69	0.69	1.2
-0.05	1.45	1.57	-0.04	0.74	0.92	0.86	0.68	-0.85	0.52	0.58	-1	0.17	0.86	0.87	1.19
2.14	3.75	4	2.27	4	2.76	2.64	3.85	0.34	3.22	3.67	0.36	3.73	3.4	3.55	4.75
1.28	2.92	3.12	1.36	2.67	0.84	0.78	2.56	1.86	3.22	3.67	2.1	1.52	1.14	1.16	2.54
1.81	1.07	1.16	1.92	4	2.93	2.81	3.85	1.86	0.88	1	2.1	1.28	1.12	1.14	2.3
1.06	0.53	0.59	1.13	4	2.93	2.81	3.85	1.88	1.02	1.16	2.12	3.03	3.4	3.55	4.05
2.14	3.75	4	2.27	1.09	2.93	2.81	1.02	1.86	3.22	3.67	2.1	1.81	0.61	0.6	2.83
0.46	1.9	2.04	0.5	1.05	0.29	0.24	0.98	0.61	0.32	0.36	0.67	-0.16	0.62	0.61	0.86
-0.34	-1.1	-1.13	-0.35	0.1	0.28	0.23	0.06	0.48	-1.2	-1.39	0.52	0.98	0.67	0.66	2
1.37	0.11	0.15	1.46	0.22	0.26	0.21	0.17	0.22	0.39	0.43	0.22	0.62	0.02	-0.02	1.64
0.16	0.75	0.83	0.18	0.47	0.98	0.91	0.42	0.9	0.22	0.24	1	0.81	0.68	0.68	1.83

-1.06	-1.29	-1.33	-1.11	-0.23	-1.54	-1.54	-0.26	-0.31	-0.66	-0.77	-0.38	-0.9	-1.2	-1.31	0.12
1.56	1.53	1.65	1.66	1.18	1.23	1.16	1.11	0.88	1.38	1.57	0.98	2.02	0.84	0.84	3.04
1.15	0.24	0.29	1.23	0.55	1.22	1.15	0.49	1.12	0.55	0.62	1.25	0.6	0.84	0.85	1.62
1.52	-0.16	-0.14	1.62	0.55	0.3	0.25	0.49	1.15	0.63	0.71	1.29	1.4	0.77	0.77	2.42
-0.97	-0.87	-0.89	-1.02	-1.25	-1.49	-1.49	-1.26	-1.7	-1.13	-1.3	-1.97	-0.44	-0.97	-1.07	0.58
0.96	0	0.03	1.03	0.01	0.52	0.47	-0.03	-0.26	0.43	0.48	-0.33	0.89	-0.01	-0.05	1.91
0.31	0.82	0.9	0.34	1.15	1.68	1.59	1.08	0.54	0.87	0.98	0.59	1.18	0.59	0.58	2.2
1.1	1.69	1.82	1.17	1.4	0.98	0.91	1.32	-0.2	0.86	0.97	-0.26	0.43	1.02	1.03	1.45
1.24	1.05	1.14	1.32	0.54	0.37	0.32	0.48	0.83	0.34	0.38	0.92	0.78	0.27	0.24	1.8
1.07	0.77	0.85	1.14	-0.01	1.74	1.65	-0.05	1.92	0.89	1.01	2.17	1.15	0.55	0.54	2.17
0.2	0.01	0.04	0.22	0.49	0.65	0.59	0.44	-1.26	0.45	0.5	-1.47	0.69	0.29	0.26	1.71
1.09	0.87	0.95	1.16	1.49	1.41	1.33	1.41	1.23	0.75	0.85	1.38	0.66	0.76	0.76	1.68
0.73	0.89	0.97	0.78	1	1.22	1.15	0.93	1.08	-0.3	-0.35	1.21	1.92	1.01	1.02	2.94
1.54	1.2	1.3	1.64	0.9	1.38	1.3	0.83	0.6	0.69	0.78	0.66	1.6	1.07	1.09	2.62
0.87	1.01	1.1	0.93	0.17	0.43	0.38	0.13	0.87	0.78	0.88	0.97	0.84	0.67	0.66	1.86
-0.59	-0.65	-0.66	-0.61	0.88	-0.94	-0.95	0.82	-1.39	-2.61	-3	-1.62	0.41	-1.31	-1.43	1.43
1.35	0.13	0.17	1.44	2.02	0.17	0.13	1.92	0.81	0.82	0.93	0.9	1.17	0.61	0.6	2.19
-0.55	-0.58	-0.58	-0.57	-0.76	-0.89	-0.9	-0.78	0.05	-0.98	-1.13	0.03	-1.33	-0.43	-0.5	-0.31
-0.3	-0.62	-0.62	-0.31	-0.75	-1.24	-1.24	-0.77	-1.43	-1.08	-1.25	-1.67	0.06	-0.22	-0.27	1.08
-0.09	0.56	0.62	-0.09	0.38	1.03	0.96	0.33	1.13	0.67	0.76	1.26	0.97	0.98	0.99	1.99
0.16	1.64	1.77	0.18	0.11	-1.3	-1.3	0.07	0.48	-1.35	-1.56	0.52	3.73	-1.93	-2.08	4.75
0.04	0.49	0.55	0.05	0.36	0.83	0.77	0.31	-1.25	0.95	1.08	-1.46	0.21	1.1	1.12	1.23
1.81	0.45	0.51	1.92	0.79	1.19	1.12	0.73	1.21	1.53	1.74	1.35	1.13	0.98	0.99	2.15
0.51	1.25	1.35	0.55	0.88	1.41	1.33	0.82	1.66	0.69	0.78	1.87	0.74	0.9	0.91	1.76
1.27	0.39	0.44	1.35	0.51	1.03	0.96	0.46	0.27	0.59	0.66	0.28	0.82	0.53	0.52	1.84

0.9	2.1	2.25	0.96	1.32	1.67	1.58	1.24	1.33	0.64	0.72	1.49	1.11	0.8	0.8	2.13
0.18	-0.23	-0.21	0.2	0.78	1.03	0.96	0.72	0.41	0.67	0.75	0.44	0.54	1.04	1.06	1.56
0.23	0.49	0.55	0.25	0.72	0.81	0.75	0.66	0.64	0.48	0.54	0.7	0.85	0.17	0.14	1.87
0.44	0.46	0.52	0.48	0.92	0.91	0.85	0.85	0.49	0.73	0.82	0.53	1.05	0.7	0.7	2.07
2.14	2.66	2.85	2.27	0.9	2.83	2.71	0.83	1.86	-1.69	-1.94	2.1	2.85	0.84	0.85	3.87
0.87	0.22	0.26	0.93	1.06	3	2.88	0.99	1.86	1.3	1.48	2.1	2	0.56	0.55	3.02
2.14	2.01	2.16	2.27	4	1.43	1.35	3.85	1.86	1.25	1.42	2.1	3.73	3.4	3.55	4.75
0.6	0.73	0.8	0.64	0.87	2.56	2.45	0.81	0.86	1.05	1.19	0.95	0.87	0.84	0.85	1.89
-1.23	1.23	1.33	-1.29	-0.51	-0.07	-0.11	-0.54	-1.45	0.7	0.79	-1.69	0.35	0.58	0.57	1.37
-0.04	-0.57	-0.57	-0.03	0.53	0.92	0.86	0.48	0.21	-1.05	-1.21	0.21	0.22	0.63	0.62	1.24
0.63	0.95	1.04	0.68	0.99	0.99	0.92	0.92	1.07	0.82	0.93	1.19	0.82	0.76	0.76	1.84
1.49	1.62	1.75	1.59	0.92	0.98	0.91	0.85	0.71	0.96	1.09	0.78	0.93	0.91	0.92	1.95
1.3	1.11	1.21	1.39	0.95	0.99	0.92	0.88	0.69	0.61	0.69	0.76	0.68	0.28	0.25	1.7
1.96	0.78	0.86	2.08	1.79	0.21	0.17	1.7	0.86	-0.08	-0.1	0.95	2.46	1.1	1.12	3.48
-1.19	-0.86	-0.88	-1.25	-0.64	-0.45	-0.48	-0.66	-1.52	-2.18	-2.51	-1.77	-0.92	-1.91	-2.06	0.1
1.19	1.4	1.51	1.27	4	2.93	2.81	3.85	1.86	1.25	1.42	2.1	3.73	3.4	3.55	4.75
0.86	0.66	0.73	0.92	1.12	-1.41	-1.41	1.05	1.68	1.01	1.14	1.89	-0.88	-0.06	-0.11	0.14
2.14	3.61	3.85	2.27	4	2.93	2.81	3.85	0.36	3.22	3.67	0.38	-1.09	0.24	0.21	-0.07
-0.54	-0.64	-0.65	-0.56	-0.81	-0.58	-0.6	-0.83	-0.27	-1.13	-1.31	-0.34	-0.58	-1.36	-1.48	0.44
2.14	3.75	4	2.27	1.89	2.67	2.56	1.8	0.34	1.7	1.93	0.36	3.73	0.97	0.98	4.75
2.14	3.75	4	2.27	4	2.72	2.6	3.85	1.73	0.95	1.08	1.95	-1.46	0.69	0.69	-0.44
1.66	0.29	0.34	1.77	0.76	0.88	0.82	0.7	0.29	0.68	0.77	0.3	-1.53	0.44	0.42	-0.51
0.5	1	1.09	0.54	0.36	0.85	0.79	0.31	1.3	0.58	0.65	1.46	0.97	0.82	0.82	1.99
0.48	0.99	1.08	0.52	-1.04	1.32	1.24	-1.05	0.86	0.8	0.9	0.95	0.77	1.01	1.02	1.79
0.22	0.67	0.74	0.24	0.88	-0.71	-0.73	0.82	1.14	0.68	0.77	1.27	1.19	0.99	1	2.21

0.07	0.38	0.43	0.08	0.76	0.5	0.45	0.7	0.94	1.03	1.17	1.05	0.23	0.8	0.8	1.25
0.15	1.18	1.28	0.17	0.74	1.26	1.19	0.68	0.48	1.13	1.28	0.52	1.24	1.06	1.08	2.26
0.44	0.64	0.71	0.48	0.89	0.97	0.9	0.83	0.64	0.73	0.82	0.7	1.05	0.67	0.67	2.07
1.03	0.4	0.45	1.1	0.57	0.1	0.06	0.51	0.93	0.85	0.96	1.03	0.48	0.84	0.84	1.5
1.51	1.16	1.26	1.61	0.67	1.34	1.26	0.61	0.9	0.89	1.01	1	0.64	0.89	0.9	1.66
1.4	0.92	1.01	1.49	1.25	1.22	1.15	1.18	0.89	1.15	1.31	0.99	1.26	1.22	1.25	2.28
0.51	0.66	0.73	0.55	0.52	0.78	0.72	0.47	0.78	0.78	0.88	0.86	1.07	0.93	0.94	2.09
0.34	0.28	0.33	0.37	1.08	0.9	0.84	1.01	0.19	0.59	0.66	0.19	1.13	0.52	0.51	2.15
-0.01	0.35	0.4	0	-0.5	0.54	0.49	-0.53	0.2	0.25	0.28	0.2	0.29	0.13	0.09	1.31
0.09	0.78	0.86	0.11	1.11	0.81	0.75	1.04	0.77	0.71	0.8	0.85	0.7	0.45	0.43	1.72
0.38	0.64	0.71	0.41	0.07	0.94	0.87	0.03	0.6	0.25	0.28	0.66	0.72	0.52	0.51	1.74
-0.78	-0.53	-0.53	-0.82	-0.82	-0.35	-0.38	-0.84	-0.28	-1.13	-1.3	-0.35	-0.31	-0.09	-0.14	0.71
-1.91	-0.42	-0.41	-2.01	-0.94	-0.29	-0.32	-0.95	-0.07	-0.28	-0.33	-0.11	-1.31	-1.18	-1.29	-0.29
-1.51	-0.72	-0.73	-1.59	-1.6	-0.87	-0.88	-1.6	0.34	-0.69	-0.8	0.36	-0.62	-2.12	-2.28	0.4
0	0.74	0.81	0.01	0.83	0.97	0.9	0.77	0.78	0.6	0.67	0.86	1.26	0.24	0.21	2.28
1.22	0.79	0.87	1.3	0.73	1.09	1.02	0.67	1.28	0.9	1.02	1.43	0.81	0.77	0.77	1.83
1.03	0.56	0.62	1.1	0.69	0.64	0.58	0.63	0.9	0.81	0.91	1	0.52	0.84	0.85	1.54
-0.63	-0.5	-0.5	-0.66	-0.85	-1.71	-1.7	-0.87	-0.19	-0.48	-0.56	-0.25	-1.22	-0.37	-0.43	-0.2
-1.24	1.23	1.33	-1.3	-0.76	1.09	1.02	-0.78	-0.14	0.91	1.03	-0.19	-0.73	-1.12	-1.22	0.29
0.06	0.38	0.43	0.07	0.2	1.45	1.37	0.15	0.63	0.83	0.94	0.69	0.41	1.08	1.1	1.43
-0.19	1.01	1.1	-0.19	0.7	0.85	0.79	0.64	0.85	0.93	1.05	0.94	0.64	0.57	0.56	1.66
-0.02	0.73	0.8	-0.01	0.88	0.78	0.72	0.82	0.85	0.6	0.67	0.94	0.73	0.33	0.31	1.75
0.16	0.84	0.92	0.18	1.13	0.81	0.75	1.06	1.21	0.6	0.68	1.35	1	1.3	1.33	2.02
-0.04	0.83	0.91	-0.03	0.88	1.01	0.94	0.82	0.68	0.66	0.74	0.75	0.85	0.31	0.28	1.87
1.1	0.35	0.4	1.17	-0.5	0.45	0.4	-0.53	-0.09	0.18	0.19	-0.13	0.52	0	-0.04	1.54

1.1	0.35	0.4	1.17	-0.5	0.45	0.4	-0.53	-0.09	0.18	0.19	-0.13	0.52	0	-0.04	1.54
1.6	0.57	0.63	1.7	-0.17	0.6	0.54	-0.21	0.96	0.51	0.57	1.07	1.09	-0.28	-0.34	2.11
0.27	1.1	1.2	0.3	0.61	1.39	1.31	0.55	1.64	0.95	1.08	1.85	1.47	0.9	0.91	2.49
-0.06	0.57	0.63	-0.05	1.72	0.45	0.4	1.63	0.54	1.01	1.14	0.59	1	0.87	0.88	2.02
-0.14	0.53	0.59	-0.14	0.42	1.12	1.05	0.37	1.03	0.9	1.02	1.15	0.83	0.73	0.73	1.85
0.27	0.24	0.29	0.3	0.71	0.73	0.67	0.65	0.32	0.7	0.79	0.34	1.36	0.19	0.16	2.38
0.78	0.37	0.42	0.84	0.62	0.66	0.6	0.56	0.84	0.71	0.8	0.93	1.1	0.49	0.48	2.12
0.3	0.87	0.95	0.33	-0.33	0.58	0.52	-0.36	0.76	0.7	0.79	0.84	1.36	-0.08	-0.13	2.38
0.88	1.07	1.16	0.94	0.85	0.24	0.19	0.79	-0.01	0.74	0.83	-0.04	1.32	0.44	0.42	2.34
0.03	0.47	0.53	0.04	1.43	0.73	0.67	1.35	0.54	0.96	1.09	0.59	1	0.82	0.82	2.02
0.21	0.73	0.8	0.23	0.62	0.82	0.76	0.56	0.84	0.72	0.81	0.93	0.5	0.05	0.01	1.52
-0.19	0.35	0.4	-0.19	-0.5	0.96	0.89	-0.53	1.33	0.25	0.28	1.49	0.42	0.15	0.12	1.44
0.76	0.92	1.01	0.81	0.24	0.97	0.9	0.19	1.24	0.59	0.66	1.39	0.87	1.06	1.08	1.89
0.11	0.33	0.38	0.13	0.45	0.72	0.66	0.4	1.05	0.68	0.77	1.17	0.74	0.76	0.76	1.76
1.44	0.53	0.59	1.53	1.23	0.68	0.62	1.16	1	0.93	1.05	1.11	0.79	0.83	0.83	1.81
0.13	0.6	0.67	0.15	-0.41	0.56	0.51	-0.44	0.77	0.67	0.76	0.85	0.68	-0.21	-0.26	1.7
-0.24	-3.61	-3.79	-0.24	0.53	0.68	0.62	0.48	0.38	0.68	0.77	0.4	1.01	0.99	1	2.03
-0.12	1.52	1.64	-0.12	0.79	-0.41	-0.44	0.73	0.02	-1.08	-1.25	-0.01	0.84	-1.14	-1.25	1.86
0.29	0.67	0.74	0.32	0.3	0.68	0.62	0.25	0.57	0.73	0.82	0.62	0.95	0.99	1	1.97
0.6	1.56	1.68	0.64	0.56	0.73	0.67	0.5	0.36	0.67	0.75	0.38	0.81	0.99	1	1.83
-0.52	0.67	0.74	-0.54	-0.72	0.68	0.62	-0.74	0.27	0.67	0.75	0.28	-0.22	0.95	0.96	0.8
-1.35	0.67	0.74	-1.42	-0.94	0.68	0.62	-0.95	0.65	0.68	0.77	0.71	0.34	0.99	1	1.36
-0.24	0.32	0.37	-0.24	0.46	1.07	1	0.41	0.74	1.09	1.24	0.82	0.53	0.66	0.65	1.55
-0.09	0.67	0.74	-0.09	0.79	0.68	0.62	0.73	0.58	0.68	0.77	0.63	0.76	0.99	1	1.78
-0.52	0.67	0.74	-0.54	0.3	0.68	0.62	0.25	0.41	0.68	0.77	0.44	0.84	0.99	1	1.86

1.6	0.67	0.74	1.7	1.33	-0.57	-0.59	1.25	0.9	0.68	0.77	1	2.41	0.99	1	3.43
0.84	0.42	0.48	0.9	0.91	0.65	0.59	0.84	1.59	0.66	0.74	1.79	1.95	0.97	0.98	2.97
0.66	0.9	0.98	0.71	1.22	0.68	0.62	1.15	1.94	0.68	0.77	2.19	1.57	0.41	0.39	2.59
0.44	-0.15	-0.13	0.48	0.04	0.68	0.62	0	0.47	0.68	0.77	0.51	1.96	0.95	0.96	2.98
2	0.67	0.74	2.13	1.08	0.68	0.62	1.01	1.46	0.68	0.77	1.64	0.91	0.99	1	1.93
1.56	0.67	0.74	1.66	0.62	0.68	0.62	0.56	0.42	0.68	0.77	0.45	1.69	0.88	0.89	2.71
1.76	1.87	2.01	1.87	1.26	0.9	0.84	1.18	3.58	1	1.13	4.07	1.51	1.21	1.24	2.53
0.66	0.92	1	0.71	-1.06	-0.17	-0.2	-1.07	0.23	1.11	1.26	0.23	-0.3	1.01	1.02	0.72
0.9	0.93	1.02	0.96	0.93	1.17	1.1	0.86	0.55	1.52	1.73	0.6	1.01	0.34	0.32	2.03
-0.48	0.85	0.93	-0.5	0.63	-1.65	-1.64	0.57	1.11	-0.09	-0.12	1.24	0.74	-1.12	-1.22	1.76
-0.48	0.85	0.93	-0.5	0.63	-1.65	-1.64	0.57	1.21	-0.09	-0.12	1.35	0.74	-1.12	-1.22	1.76
0.08	0.85	0.93	0.09	-0.44	-1.65	-1.64	-0.47	0.55	-0.09	-0.12	0.6	0.31	-1.12	-1.22	1.33
0.03	0.85	0.93	0.04	0.38	-1.65	-1.64	0.33	0.55	-0.09	-0.12	0.6	0.56	-1.12	-1.22	1.58
-0.06	0.85	0.93	-0.05	0.29	-1.65	-1.64	0.24	0.55	-0.09	-0.12	0.6	0.56	-1.12	-1.22	1.58
-0.78	-0.71	-0.72	-0.82	-0.85	-1.4	-1.4	-0.87	-1.37	-1.79	-2.06	-1.6	-0.3	-1.66	-1.8	0.72
-0.78	-0.71	-0.72	-0.82	-0.85	-1.4	-1.4	-0.87	-1.37	-1.79	-2.06	-1.6	-0.3	-1.66	-1.8	0.72
-0.65	-0.42	-0.41	-0.68	0.25	-0.02	-0.06	0.2	0.09	-1.32	-1.52	0.07	0.3	0.35	0.33	1.32
0.04	1.28	1.39	0.05	-0.66	0.65	0.59	-0.68	-0.28	1.1	1.25	-0.35	0.19	0.63	0.62	1.21
-2.76	-1.15	-1.18	-2.91	-0.31	-0.82	-0.84	-0.34	-0.55	-1.95	-2.24	-0.66	-0.52	-0.93	-1.02	0.5
-0.99	-0.88	-0.9	-1.04	-0.16	-1.87	-1.86	-0.2	-0.2	-1.87	-2.15	-0.26	-1.1	-0.8	-0.89	-0.08
-1.71	-0.72	-0.73	-1.8	-0.18	-1.9	-1.89	-0.21	-1.33	-2.16	-2.48	-1.55	-0.44	-0.67	-0.75	0.58
-0.85	-1.06	-1.09	-0.89	-0.25	-1.09	-1.1	-0.28	-0.85	-1.12	-1.29	-1	-0.67	-1.17	-1.28	0.35
-1.67	-0.91	-0.93	-1.76	-0.54	-2.44	-2.41	-0.56	-1.17	-0.74	-0.86	-1.37	-0.68	-1.21	-1.32	0.34
-1.3	-0.68	-0.69	-1.37	-0.55	-1.06	-1.07	-0.57	-1.19	-1.1	-1.27	-1.39	-0.38	-1.49	-1.62	0.64
-1.04	-0.85	-0.87	-1.09	-0.51	-1.28	-1.28	-0.54	-1.75	-2.47	-2.84	-2.03	-0.57	-1.18	-1.29	0.45

-3.01	-0.72	-0.73	-3.17	-0.4	-1.96	-1.94	-0.43	-1.47	-1.48	-1.71	-1.71	-0.32	-0.98	-1.08	0.7
-1.5	-0.91	-0.93	-1.58	-0.69	-1.01	-1.02	-0.71	-0.52	-2.15	-2.47	-0.62	-0.28	-0.9	-0.99	0.74
-4	-0.45	-0.44	-4.22	-0.98	-1.39	-1.39	-0.99	-0.7	-1.13	-1.3	-0.83	-0.08	-1.32	-1.44	0.94
0.87	-3.61	-3.79	0.93	1.04	1.03	0.96	0.97	1.59	0.67	0.76	1.79	1.18	0.85	0.86	2.2
2.14	3.75	4	2.27	4	2.93	2.81	3.85	1.86	3.22	3.67	2.1	3.73	0.71	0.71	4.75
0.65	0.47	0.53	0.7	0.67	0.7	0.64	0.61	0.4	0.56	0.63	0.43	0.56	0.31	0.28	1.58
1.67	3.75	4	1.78	2.65	2.09	1.99	2.54	1.28	1.99	2.26	1.43	3.03	0.76	0.76	4.05
2.14	3.14	3.35	2.27	4	2.93	2.81	3.85	1.86	1.42	1.61	2.1	2.27	1.03	1.05	3.29
2.28	3.75	4	2.42	4	-1.33	-1.33	3.85	1.86	3.22	3.67	2.1	1.23	1.16	1.18	2.25
1	-1.5	-1.56	1.07	0.74	0.06	0.02	0.68	0.96	0.85	0.96	1.07	1.64	-0.27	-0.33	2.66
0.55	-0.14	-0.12	0.59	0.27	0.14	0.1	0.22	-0.75	0.94	1.06	-0.89	0.03	0.31	0.29	1.05
1.56	3.75	4	1.66	4	2.93	2.81	3.85	1.86	3.22	3.67	2.1	2.8	2.34	2.43	3.82
1.62	1.57	1.69	1.72	2.12	0.89	0.83	2.02	-0.09	-0.97	-1.12	-0.13	0.18	3.17	3.3	1.2
0.71	3.75	4	0.76	-2.14	-0.24	-0.27	-2.12	0.27	0.38	0.42	0.28	0.19	0.6	0.59	1.21
-1.88	0.4	0.46	-1.98	-0.66	-0.61	-0.63	-0.68	-0.9	3.22	3.67	-1.06	0.41	0.63	0.62	1.43
-1.49	-0.7	-0.71	-1.57	-0.48	-0.78	-0.8	-0.51	-1.32	-1.09	-1.26	-1.54	-0.03	-0.51	-0.58	0.99
-1.99	-0.99	-1.02	-2.1	-0.57	-1.35	-1.35	-0.59	-1.42	-1.13	-1.31	-1.65	-0.26	-0.3	-0.36	0.76
-0.62	-1.03	-1.06	-0.65	-0.64	-4.08	-4	-0.66	-1.32	-1.13	-1.3	-1.54	-0.35	-1.17	-1.28	0.67
2.14	3.75	4	2.27	4	2.72	2.6	3.85	-0.06	3.22	3.67	-0.1	-1.06	3.4	3.55	-0.04
-3.29	-0.69	-0.7	-3.47	-0.34	-0.88	-0.89	-0.37	-1.09	-2.18	-2.51	-1.28	-0.67	-0.76	-0.84	0.35
-0.73	-0.9	-0.92	-0.76	-0.51	-2.17	-2.15	-0.54	-0.69	-1.12	-1.29	-0.82	-0.3	-2.14	-2.3	0.72
-0.35	-0.04	-0.01	-0.36	0.58	0.79	0.73	0.52	-0.33	0.46	0.52	-0.41	0.88	0.75	0.75	1.9
-0.15	0.81	0.89	-0.15	0.03	0.9	0.84	-0.01	0.8	1.17	1.33	0.89	1.1	0.01	-0.03	2.12
0.45	0.32	0.37	0.49	-0.09	0.35	0.3	-0.13	0.35	0.49	0.55	0.37	0.54	0.48	0.46	1.56
-0.49	0.27	0.32	-0.51	0.42	1.26	1.19	0.37	0.82	0.81	0.91	0.91	0.97	0.39	0.37	1.99

-0.49	0.27	0.32	-0.51	0.42	1.26	1.19	0.37	0.54	0.81	0.91	0.59	0.97	0.38	0.36	1.99
0.61	1.42	1.53	0.66	0.53	1.42	1.34	0.48	0.94	0.72	0.81	1.05	0.86	0.48	0.46	1.88
0.5	-0.12	-0.09	0.54	0.93	0.74	0.68	0.86	0.58	0.82	0.93	0.63	1.25	0.21	0.18	2.27
-0.23	0.19	0.23	-0.23	1.14	1.13	1.06	1.07	0.88	0.54	0.61	0.98	0.25	-1.13	-1.24	1.27
0.05	0.61	0.68	0.06	0.55	0.91	0.85	0.49	0.86	0.57	0.64	0.95	0.37	0.84	0.84	1.39
1.08	2.23	2.39	1.15	-0.44	-2.67	-2.63	-0.47	1.5	0.72	0.81	1.69	-0.48	0.96	0.97	0.54
-0.55	0.7	0.77	-0.57	0.99	0.5	0.45	0.92	0.66	1.09	1.24	0.73	1.23	0.76	0.76	2.25
0.71	0.6	0.67	0.76	0.36	0.05	0.01	0.31	1.86	-0.2	-0.24	2.1	0.51	-1.12	-1.22	1.53
0.14	0.42	0.48	0.16	0.6	0.54	0.49	0.54	0.96	0.39	0.44	1.07	0.75	-0.13	-0.18	1.77
0.96	1.31	1.42	1.03	1.31	1.44	1.36	1.23	0.37	0.75	0.85	0.39	1.04	0.63	0.62	2.06
2.24	3.75	4	2.38	4	2.63	2.52	3.85	1.86	3.22	3.67	2.1	2.8	1.24	1.27	3.82
0.98	-0.41	-0.4	1.05	1.15	-0.45	-0.48	1.08	0.75	-0.76	-0.88	0.83	2.87	0.7	0.7	3.89
2.14	1.85	1.99	2.27	0.51	2.93	2.81	0.46	0.5	1.44	1.64	0.54	0.89	0.67	0.67	1.91
0.47	0.47	0.53	0.51	0.81	1.31	1.23	0.75	1.65	0.39	0.43	1.86	0.23	0.3	0.27	1.25
-0.78	-0.71	-0.72	-0.82	-0.85	-1.4	-1.4	-0.87	-1.37	-1.79	-2.06	-1.6	-0.3	-1.66	-1.8	0.72
0.47	0.47	0.53	0.51	0.68	1.31	1.23	0.62	1.65	0.39	0.43	1.86	0.68	0.3	0.27	1.7
0.68	1.01	1.1	0.73	0.96	2.15	2.05	0.89	1.08	1.3	1.48	1.21	1.33	0.44	0.42	2.35
0.17	0.17	0.21	0.19	0.38	0.32	0.27	0.33	0.38	0.9	1.02	0.4	0.5	-1.07	-1.17	1.52
0.3	0.11	0.15	0.33	0.27	0.71	0.65	0.22	0.52	0.61	0.69	0.56	1.02	0.23	0.2	2.04
0.09	0.55	0.61	0.11	0.46	0.72	0.66	0.41	0.97	0.59	0.66	1.08	0.69	0.22	0.19	1.71
0.26	0.46	0.52	0.29	0.07	0.85	0.79	0.03	0.15	0.92	1.04	0.14	0.89	0.36	0.34	1.91
0.24	1.07	1.16	0.26	0.53	0.89	0.83	0.48	0.47	0.9	1.02	0.51	1.12	0.49	0.47	2.14
-0.02	1.91	2.05	-0.01	0.63	0.21	0.17	0.57	0.81	0.6	0.68	0.9	1.01	-0.15	-0.2	2.03
0.32	0.3	0.35	0.35	0.9	0.69	0.63	0.83	1.1	0.34	0.38	1.23	0.38	0.77	0.77	1.4
0.76	0.3	0.35	0.81	0.77	0.73	0.67	0.71	-0.62	1.09	1.23	-0.74	0.79	0.32	0.3	1.81

-0.77	-1.26	-1.3	-0.8	-0.5	-1.02	-1.03	-0.53	0.29	-1.13	-1.31	0.3	1.18	-1.16	-1.27	2.2
2.14	0.27	0.32	2.27	4	0.34	0.29	3.85	1.67	0.22	0.24	1.88	0.36	0.31	0.29	1.38
0.15	0.21	0.25	0.17	0.57	0.84	0.78	0.51	0.74	0.66	0.74	0.82	0.74	0.78	0.78	1.76
1.25	0.76	0.84	1.33	0.98	1.25	1.18	0.91	0.96	0.81	0.92	1.07	0.68	0.39	0.37	1.7
0.53	0.45	0.51	0.57	0.48	1.39	1.31	0.43	0.19	0.6	0.67	0.19	1.23	0.81	0.81	2.25
0.91	1.29	1.4	0.97	0.3	1.2	1.13	0.25	0.61	0.53	0.59	0.67	1.48	0.52	0.51	2.5
-1.16	-0.56	-0.56	-1.22	-0.61	-1.47	-1.47	-0.63	-0.8	-1.76	-2.03	-0.95	-0.3	-1.3	-1.42	0.72
0.04	0.53	0.59	0.05	0.89	0.64	0.58	0.83	1.01	1.01	1.14	1.13	0.91	0.82	0.82	1.93
0.36	0.37	0.42	0.39	0.83	0.89	0.83	0.77	0.02	0.84	0.95	-0.01	0.6	0.96	0.97	1.62
0.5	0.07	0.11	0.54	0.38	0.37	0.32	0.33	0.42	0.29	0.32	0.45	0.91	0.39	0.37	1.93
0.77	0.41	0.47	0.82	0.26	0.75	0.69	0.21	0.62	0.44	0.49	0.68	-0.06	0.46	0.44	0.96
-0.37	0.12	0.16	-0.38	-0.49	0.8	0.74	-0.52	0.69	0.24	0.26	0.76	0.34	0.42	0.4	1.36
-0.12	-0.93	-0.95	-0.12	-2.38	-1.38	-1.38	-2.35	-2.23	-0.44	-0.51	-2.58	-0.42	-0.2	-0.25	0.6
0.35	-0.68	-0.69	0.38	0.21	-0.32	-0.35	0.16	0.7	-1.25	-1.44	0.77	1.83	-1.15	-1.26	2.85
0.41	0.5	0.56	0.44	0.87	0.64	0.58	0.81	0.75	0.8	0.9	0.83	1.04	0.45	0.43	2.06
-0.32	0.05	0.08	-0.33	0.79	1.3	1.22	0.73	0.94	0.42	0.47	1.05	0.82	0.59	0.58	1.84
-0.32	0.47	0.53	-0.33	0.59	0.49	0.44	0.53	0.59	0.8	0.9	0.64	0.78	0.65	0.64	1.8
0.52	0.41	0.47	0.56	0.55	0.23	0.18	0.49	1.01	0.83	0.94	1.13	0.89	0.81	0.81	1.91
0.35	0.04	0.07	0.38	0.68	0.68	0.62	0.62	1.29	0.93	1.05	1.45	0.64	0.85	0.86	1.66
-3.29	0.35	0.4	-3.47	0.34	1.15	1.08	0.29	0.61	0.81	0.91	0.67	0.63	0.62	0.61	1.65
1.74	-0.87	-0.89	1.85	-1.89	0.03	-0.01	-1.88	-1.3	0.09	0.09	-1.52	-1.53	1.13	1.15	-0.51
-0.87	-0.98	-1.01	-0.91	-1.29	-0.05	-0.09	-1.29	-1.37	0.05	0.05	-1.6	-1.31	1.23	1.26	-0.29
1.5	-0.87	-0.89	1.6	-1.04	-1.79	-1.78	-1.05	-0.23	-0.6	-0.7	-0.29	-1.51	0.96	0.97	-0.49
-0.75	-0.87	-0.89	-0.78	-1.33	-0.05	-0.09	-1.33	-1.3	0.09	0.09	-1.52	-1.42	1.29	1.32	-0.4
0.04	-0.98	-1.01	0.05	-1.83	-0.12	-0.16	-1.82	-1.3	0.13	0.14	-1.52	-1.53	1.39	1.43	-0.51

-0.13	-0.67	-0.68	-0.13	-2.21	-0.12	-0.16	-2.19	-1.22	0.04	0.03	-1.43	-1.35	1.38	1.42	-0.33
1.74	-0.98	-1.01	1.85	-1.71	-0.19	-0.22	-1.7	-1.32	-0.8	-0.93	-1.54	-1.53	1.02	1.04	-0.51
1.32	-0.98	-1.01	1.41	-1.83	-0.24	-0.27	-1.82	-1.26	-0.03	-0.05	-1.47	-1.49	-0.01	-0.05	-0.47
1.51	-0.83	-0.85	1.61	-1.85	0.03	-0.01	-1.84	-1.31	0.04	0.04	-1.53	-1.31	1.14	1.16	-0.29
1.4	-0.87	-0.89	1.49	-1.06	0.03	-0.01	-1.07	-1.26	0.09	0.09	-1.47	-1.53	1.41	1.45	-0.51
1.64	-0.87	-0.89	1.75	-1.44	-0.19	-0.22	-1.44	-1.3	0.04	0.03	-1.52	-1.35	1.48	1.52	-0.33
1.78	-0.98	-1.01	1.89	-0.97	-0.13	-0.17	-0.98	-1.3	-0.02	-0.04	-1.52	-1.44	1.38	1.42	-0.42
0.81	-1.05	-1.08	0.87	-1.83	-0.02	-0.06	-1.82	-1.3	0.12	0.13	-1.52	-1.53	1.48	1.52	-0.51
1.78	-0.98	-1.01	1.89	-2.31	0.03	-0.01	-2.29	0.14	0.09	0.09	0.13	-1.44	1.48	1.52	-0.42
1.83	-0.94	-0.96	1.95	-2.22	-0.25	-0.28	-2.2	-1.25	-0.04	-0.06	-1.46	-1.35	0.6	0.59	-0.33
1.74	-0.98	-1.01	1.85	-1.67	-0.03	-0.07	-1.66	-1.3	-0.1	-0.13	-1.52	-1.53	0.94	0.95	-0.51
0.44	-0.87	-0.89	0.48	-1.83	-0.07	-0.11	-1.82	-1.3	0.09	0.09	-1.52	-1.53	1.32	1.35	-0.51
1.74	-0.79	-0.8	1.85	-1.56	-0.41	-0.44	-1.56	-1.33	0.03	0.02	-1.55	-1.33	-1.1	-1.2	-0.31
0.73	-0.98	-1.01	0.78	-1.71	-0.2	-0.23	-1.7	-1.25	0.06	0.06	-1.46	-1.53	1.23	1.26	-0.51
0.58	-1.79	-1.86	0.62	-1.69	-0.26	-0.29	-1.68	-1.28	-0.12	-0.15	-1.49	-0.27	1.48	1.52	0.75
1.18	-0.87	-0.89	1.26	-1.59	-0.16	-0.19	-1.59	-0.21	0.09	0.09	-0.27	-1.53	1.23	1.26	-0.51
1.74	-0.84	-0.86	1.85	-1.83	-0.07	-0.11	-1.82	-1.33	0.03	0.02	-1.55	-1.53	1.14	1.16	-0.51
1.66	-0.98	-1.01	1.77	-1.83	-0.11	-0.15	-1.82	-1.31	1.09	1.24	-1.53	-1.27	0.99	1	-0.25
1.15	0.61	0.68	1.23	-1.92	-0.65	-0.67	-1.91	-1.25	0.91	1.03	-1.46	-1.64	-1.21	-1.32	-0.62
-0.12	0.57	0.64	-0.12	-1.93	-0.2	-0.23	-1.92	-1.3	0.8	0.9	-1.52	-1.51	0.95	0.96	-0.49
1.74	-0.87	-0.89	1.85	-1.71	0.03	-0.01	-1.7	-1.3	0.09	0.09	-1.52	-1.53	1.08	1.1	-0.51
1.26	3.75	4	1.34	-1.83	1.87	1.78	-1.82	-1.3	3.22	3.67	-1.52	-1.53	1.48	1.52	-0.51
0.97	-0.86	-0.88	1.04	-1.81	-0.64	-0.66	-1.8	-1.3	0.09	0.09	-1.52	-1.44	0.87	0.88	-0.42
2.04	0.72	0.79	2.17	-1.56	1.87	1.78	-1.56	-1.31	3.07	3.5	-1.53	-1.39	1.22	1.25	-0.37
1.05	-0.87	-0.89	1.12	-1.6	0.03	-0.01	-1.6	-1.3	0.06	0.06	-1.52	-1.53	1.34	1.37	-0.51

1.74	-0.87	-0.89	1.85	-1.83	-0.18	-0.21	-1.82	-1.3	-0.17	-0.21	-1.52	-1.53	1.34	1.37	-0.51
1.53	-0.98	-1.01	1.63	-1.83	0.03	-0.01	-1.82	-1.3	-0.03	-0.05	-1.52	-1.57	1.34	1.37	-0.55
1.59	-0.48	-0.48	1.69	-0.69	-0.03	-0.07	-0.71	0.48	-0.17	-0.21	0.52	-0.14	-0.19	-0.24	0.88
2.02	-0.41	-0.4	2.15	-0.58	-0.18	-0.21	-0.6	-0.22	-0.3	-0.35	-0.28	-0.28	0.4	0.38	0.74
0.84	-0.59	-0.59	0.9	-1.47	-0.53	-0.55	-1.47	-2.43	-0.24	-0.29	-2.81	0	-0.29	-0.35	1.02
1.66	-0.81	-0.83	1.77	-0.18	-0.25	-0.28	-0.21	0.42	-0.6	-0.7	0.45	-0.6	0.21	0.18	0.42
1.78	-0.29	-0.28	1.89	-1.91	-1.54	-1.54	-1.9	-1.05	-0.34	-0.4	-1.23	-0.36	0.4	0.38	0.66
1.57	-0.48	-0.48	1.67	-0.62	-0.19	-0.22	-0.64	0.04	-0.3	-0.36	0.02	-0.43	-0.3	-0.36	0.59
1.78	-0.29	-0.28	1.89	-1.96	-1.54	-1.54	-1.95	-1.39	-0.34	-0.4	-1.62	-1.53	0.4	0.38	-0.51
1.66	-0.81	-0.83	1.77	-0.18	-0.25	-0.28	-0.21	0.42	-0.6	-0.7	0.45	-0.6	0.21	0.18	0.42
2.13	-0.41	-0.4	2.26	-2.61	0.02	-0.02	-2.58	0.24	-0.43	-0.5	0.24	-0.45	0.4	0.38	0.57
1.74	-0.56	-0.56	1.85	-0.5	-0.86	-0.87	-0.53	-0.34	-0.23	-0.27	-0.42	-0.29	1.56	1.61	0.73
1.27	-0.26	-0.24	1.35	-1.5	-0.84	-0.86	-1.5	0.24	-0.1	-0.13	0.24	0.05	-0.05	-0.09	1.07
1.66	-0.46	-0.45	1.77	-0.18	-2.48	-2.45	-0.21	-0.28	-0.67	-0.78	-0.35	-1.51	0.06	0.02	-0.49
1.58	-0.34	-0.33	1.68	-1.09	-1.36	-1.36	-1.1	0.25	-0.17	-0.21	0.26	-0.53	-0.12	-0.17	0.49
1.74	-0.63	-0.63	1.85	-0.16	-0.9	-0.91	-0.2	-1.26	-0.58	-0.67	-1.47	-0.89	0.21	0.18	0.13
1.59	-0.91	-0.93	1.69	-0.28	-1.39	-1.39	-0.31	-0.06	-0.67	-0.78	-0.1	-1.32	-0.76	-0.85	-0.3
1.54	-0.51	-0.51	1.64	-1.09	-0.31	-0.34	-1.1	0.25	-1.23	-1.42	0.26	-0.53	0.34	0.32	0.49
1.74	-0.66	-0.67	1.85	-0.17	-0.75	-0.77	-0.21	0.02	-0.44	-0.52	-0.01	-1.45	0.24	0.21	-0.43
0.66	0.59	0.66	0.71	0.87	-0.19	-0.22	0.81	0.42	-0.22	-0.26	0.45	0.98	-0.29	-0.35	2
0.25	0.85	0.93	0.27	0.76	-1.65	-1.64	0.7	0.59	-0.09	-0.12	0.64	0.87	-1.12	-1.22	1.89
1.27	-0.49	-0.49	1.35	-1.48	-0.38	-0.41	-1.48	0.51	-0.23	-0.28	0.55	-0.08	0.56	0.55	0.94
0.09	-0.73	-0.74	0.11	-0.28	-1.36	-1.36	-0.31	0.69	-0.59	-0.69	0.76	-0.7	0.24	0.21	0.32
0.73	0.88	0.96	0.78	0.47	0.58	0.52	0.42	1.01	0.68	0.77	1.13	1.42	0.49	0.47	2.44
0.62	0.67	0.74	0.67	0.33	0.6	0.54	0.28	0.92	0.68	0.77	1.02	1.34	0.36	0.34	2.36

1.77	-0.29	-0.28	1.88	-0.06	-1.39	-1.39	-0.1	0.52	-0.72	-0.84	0.56	-0.49	0.4	0.38	0.53
1.94	-0.46	-0.45	2.06	-1.28	-0.15	-0.18	-1.28	0.42	-0.35	-0.41	0.45	-0.15	0.48	0.46	0.87
1.54	-0.63	-0.63	1.64	-1.48	0.23	0.18	-1.48	0.64	-0.58	-0.67	0.7	-0.4	-0.15	-0.2	0.62
1.78	-0.29	-0.28	1.89	-1.91	-1.54	-1.54	-1.9	-1.77	-0.34	-0.4	-2.05	-0.36	0.4	0.38	0.66
1.24	0.59	0.66	1.32	0.59	0.96	0.89	0.53	0.47	-0.74	-0.86	0.51	0.3	0.38	0.36	1.32
0.66	0.4	0.46	0.71	0.95	1.04	0.97	0.88	-0.21	-0.79	-0.92	-0.27	0.9	-0.29	-0.35	1.92
0.45	0.18	0.22	0.49	0.74	1.11	1.04	0.68	0.46	0.77	0.87	0.5	-0.16	0.99	1	0.86
0.29	0.27	0.32	0.32	0.92	0.58	0.52	0.85	0.66	0.63	0.71	0.73	1.02	0.81	0.81	2.04
-0.38	-0.19	-0.17	-0.39	0.44	0.73	0.67	0.39	-1.2	0.64	0.72	-1.4	1.11	-0.12	-0.17	2.13
0.59	0.7	0.77	0.63	0.88	1.23	1.16	0.82	0.6	0.95	1.07	0.66	1.15	0.79	0.79	2.17
0.79	0.82	0.9	0.85	0.78	0.62	0.56	0.72	0.69	0.74	0.83	0.76	-0.14	0.49	0.47	0.88
0.42	0.57	0.64	0.45	0.79	-0.11	-0.15	0.73	0.83	-0.25	-0.3	0.92	0.61	0.62	0.61	1.63
0.24	0.97	1.06	0.26	0.73	1.16	1.09	0.67	0.8	0.77	0.87	0.89	0.78	1.28	1.31	1.8
0.89	-0.85	-0.87	0.95	-0.41	-0.39	-0.42	-0.44	0.36	-0.37	-0.43	0.38	-0.08	-0.55	-0.62	0.94
1.66	-1.2	-1.24	1.77	-1.71	-0.2	-0.23	-1.7	-0.28	-0.41	-0.48	-0.35	-1.07	0.1	0.06	-0.05
1.27	-0.69	-0.7	1.35	-0.73	-1.05	-1.06	-0.75	0.2	-1.33	-1.53	0.2	-0.14	-0.31	-0.37	0.88
1.54	-0.49	-0.49	1.64	-0.72	-0.04	-0.08	-0.74	0.64	-0.61	-0.71	0.7	-0.39	0.33	0.31	0.63
1.08	-0.46	-0.45	1.15	-0.64	-0.75	-0.77	-0.66	0.64	-1	-1.16	0.7	-0.65	0.14	0.11	0.37
-4	-0.8	-0.81	-4.22	-0.8	-2.92	-2.88	-0.82	-1.39	-1.6	-1.84	-1.62	-0.26	0.26	0.23	0.76
1.31	-0.36	-0.35	1.4	-0.3	-0.34	-0.37	-0.33	0.31	-0.83	-0.96	0.32	0.05	0	-0.04	1.07
0.24	-3.61	-3.79	0.26	-0.27	-2.17	-2.15	-0.3	1.16	0.66	0.74	1.3	-1.23	0.53	0.52	-0.21
1.53	-0.12	-0.09	1.63	0.99	1.03	0.96	0.92	0.48	0.62	0.7	0.52	0.9	1.02	1.04	1.92
-3.29	1.17	1.27	-3.47	-2.14	0.8	0.74	-2.12	-1.39	0.9	1.02	-1.62	-1.53	-1.29	-1.4	-0.51
0.95	1.25	1.35	1.02	0.68	0.8	0.74	0.62	0.72	0.88	0.99	0.79	0.77	0.82	0.82	1.79
1.27	-0.6	-0.6	1.35	-1.09	-0.19	-0.22	-1.1	0.38	-0.1	-0.13	0.4	-0.61	1.56	1.61	0.41

1.78	-0.82	-0.84	1.89	-2.77	0.07	0.03	-2.73	-1.17	-0.61	-0.71	-1.37	-0.1	-0.59	-0.67	0.92
0.96	-0.83	-0.85	1.03	-1.94	-0.74	-0.76	-1.93	-2.17	-0.47	-0.55	-2.51	-0.31	-0.29	-0.35	0.71
1.74	-0.32	-0.31	1.85	-0.3	-0.08	-0.12	-0.33	-0.02	-0.2	-0.24	-0.05	-0.25	0.25	0.22	0.77
1.74	-0.57	-0.57	1.85	-0.18	-0.25	-0.28	-0.21	-0.03	-1.03	-1.19	-0.06	-0.67	0.21	0.18	0.35
1.78	-0.75	-0.76	1.89	-1.88	-1.35	-1.35	-1.87	-0.33	-1.13	-1.3	-0.41	-0.23	1.21	1.24	0.79
1.94	-1.61	-1.67	2.06	-0.57	-1.28	-1.28	-0.59	0.32	-0.79	-0.91	0.34	-0.04	0.48	0.46	0.98
1.44	-1.04	-1.07	1.53	-0.21	-0.63	-0.65	-0.24	-0.71	-0.44	-0.52	-0.84	-0.77	-1.18	-1.29	0.25
0.86	-0.46	-0.46	0.92	-0.48	-0.07	-0.11	-0.51	-0.33	-0.09	-0.11	-0.41	0.05	-1.2	-1.31	1.07
0.95	1.17	1.27	1.02	0.76	0.8	0.74	0.7	0.72	0.9	1.02	0.79	1.05	0.82	0.82	2.07
0.8	-0.47	-0.47	0.86	-0.62	-1.33	-1.33	-0.64	0.11	-0.04	-0.06	0.1	-0.04	-0.22	-0.27	0.98
0.32	-0.57	-0.57	0.35	-0.83	-0.99	-1	-0.85	-0.14	-0.86	-1	-0.19	-1.33	0.2	0.17	-0.31
0.09	-0.71	-0.72	0.11	-0.49	-0.27	-0.3	-0.52	-0.07	-1.08	-1.25	-0.11	-0.35	0.12	0.08	0.67
-0.67	-0.89	-0.91	-0.7	-0.96	0.04	0	-0.97	0.4	0.07	0.07	0.43	-0.21	1.17	1.19	0.81
1.74	-0.98	-1.01	1.85	-1.92	-0.13	-0.17	-1.91	0.41	-1.09	-1.26	0.44	-1.55	1.56	1.61	-0.53
1.01	1.16	1.26	1.08	-1.4	-0.05	-0.09	-1.4	-1.3	-0.73	-0.85	-1.52	-1.59	1.17	1.19	-0.57
1.21	-1.57	-1.63	1.29	-2.01	-1.1	-1.11	-1.99	0.18	-0.18	-0.22	0.18	-1.53	-0.44	-0.51	-0.51
0.3	0.77	0.85	0.33	0.57	0.53	0.48	0.51	0.49	0.45	0.5	0.53	-1.38	0.77	0.77	-0.36
0.29	0.88	0.96	0.32	0.68	1	0.93	0.62	1.1	0.67	0.76	1.23	1.22	-0.8	-0.89	2.24
-0.49	-1.02	-1.05	-0.51	-1.24	-1.57	-1.56	-1.25	-1.3	0.09	0.09	-1.52	-0.28	-0.39	-0.45	0.74
1.84	0.75	0.83	1.96	-1.92	-0.13	-0.17	-1.91	0.27	0.66	0.74	0.28	-0.7	1.36	1.39	0.32
1.04	1.88	2.02	1.11	-2.08	-0.13	-0.17	-2.06	-1.31	1.37	1.56	-1.53	-1.58	1.5	1.54	-0.56
1.83	0.46	0.52	1.95	-1.69	0.86	0.8	-1.68	0.11	-1.39	-1.6	0.1	1.53	1.4	1.44	2.55
1.79	0.66	0.73	1.9	-1.73	-0.05	-0.09	-1.72	-0.05	1.04	1.18	-0.09	0.08	1.35	1.38	1.1
1.76	1.38	1.49	1.87	-0.91	-0.05	-0.09	-0.92	-0.63	0.95	1.08	-0.75	-1.55	1.29	1.32	-0.53
1.74	-1.11	-1.14	1.85	-1.92	0.77	0.71	-1.91	-0.53	0.09	0.09	-0.64	-1.53	1.56	1.61	-0.51

1.74	0.49	0.55	1.85	-1.99	-0.05	-0.09	-1.97	2.06	0.57	0.64	2.33	-1.58	1.56	1.61	-0.56
2.04	-0.98	-1.01	2.17	-1.6	0.79	0.73	-1.6	-1.3	0.03	0.02	-1.52	-1.39	1.14	1.16	-0.37
1.11	-0.98	-1.01	1.18	-1.89	-0.5	-0.52	-1.88	-1.31	0.09	0.09	-1.53	-1.47	0.95	0.96	-0.45
-3.89	-0.98	-1.01	-4.11	-0.75	-0.25	-0.28	-0.77	-1.3	0.01	0	-1.52	-1.53	-0.66	-0.74	-0.51
-1.87	-1.22	-1.26	-1.97	-1.68	-3.08	-3.03	-1.67	-1.3	-1	-1.15	-1.52	-0.88	-1.19	-1.3	0.14
-0.58	-0.83	-0.85	-0.6	-1.17	-0.15	-0.18	-1.18	-1.29	0.02	0.01	-1.51	-0.5	-0.38	-0.44	0.52
0.21	0.48	0.54	0.23	0.45	1.23	1.16	0.4	0.81	0.22	0.24	0.9	0.93	0.52	0.51	1.95
0.3	0.67	0.74	0.33	0.57	0.68	0.62	0.51	-0.14	0.05	0.05	-0.19	0.87	0.86	0.87	1.89
-0.43	-0.22	-0.2	-0.44	-0.65	0.12	0.08	-0.67	-1.28	0.09	0.09	-1.49	0	-1.51	-1.64	1.02
2.21	-0.34	-0.33	2.35	-1.22	-0.07	-0.11	-1.23	0.93	-1.19	-1.37	1.03	-0.11	1.37	1.4	0.91
1.79	-0.98	-1	1.9	-1.83	-1.57	-1.56	-1.82	-0.62	-1.03	-1.19	-0.74	-0.77	1.5	1.54	0.25
-0.7	-0.6	-0.6	-0.73	-0.36	-0.95	-0.96	-0.39	-1.3	0.31	0.34	-1.52	-0.71	-1.31	-1.43	0.31
0.49	0.76	0.84	0.53	0.67	1.02	0.95	0.61	0.46	0.25	0.27	0.5	0.96	0.71	0.71	1.98
2.56	-0.71	-0.72	2.72	-2.3	-0.62	-0.64	-2.28	-0.13	-0.56	-0.65	-0.18	-0.23	0.24	0.21	0.79
2.28	-1.25	-1.29	2.42	-2.01	-1.45	-1.45	-1.99	4	-0.29	-0.34	4.55	-0.16	1.11	1.13	0.86
1.79	0.46	0.52	1.9	-1.73	0.8	0.74	-1.72	-2.41	1.31	1.49	-2.79	-1.61	1.38	1.42	-0.59
-0.87	0.86	0.94	-0.91	-0.37	-1.23	-1.23	-0.4	-1.3	0.09	0.09	-1.52	-1.34	-0.87	-0.96	-0.32
1.74	1.19	1.29	1.85	-1.92	0.75	0.69	-1.91	-1.33	0.09	0.09	-1.55	-1.03	1.46	1.5	-0.01
1.79	0.74	0.81	1.9	-1.85	-0.05	-0.09	-1.84	-0.48	0.87	0.98	-0.58	-1.53	1.56	1.61	-0.51
1.74	1.47	1.59	1.85	-1.92	-0.05	-0.09	-1.91	-1.21	0.86	0.97	-1.41	-1.26	1.33	1.36	-0.24
1.18	-1.29	-1.33	1.26	-1.8	-0.22	-0.25	-1.79	-0.03	-0.51	-0.59	-0.06	-1.53	1.18	1.2	-0.51
1.4	2.12	2.27	1.49	-1.82	-0.5	-0.52	-1.81	0.07	0.09	0.09	0.05	-0.02	0.93	0.94	1
-0.92	-0.98	-1.01	-0.96	-0.49	0.31	0.26	-0.52	-1.3	0.02	0.01	-1.52	0.14	-0.92	-1.01	1.16
-0.33	-0.69	-0.7	-0.34	-1.09	-0.58	-0.6	-1.1	-1.3	0.18	0.19	-1.52	-0.85	-0.36	-0.42	0.17
0.7	0.64	0.71	0.75	0.6	1.17	1.1	0.54	1.6	-0.49	-0.57	1.8	1.42	0.88	0.89	2.44

1.74	-0.52	-0.52	1.85	-1.94	-1.07	-1.08	-1.93	-0.71	-3.38	-3.88	-0.84	-1.53	0.03	-0.01	-0.51
-0.32	-0.78	-0.79	-0.33	-1.79	-0.05	-0.09	-1.78	-0.88	-0.22	-0.26	-1.04	-1.61	1.41	1.45	-0.59
1.79	-0.09	-0.06	1.9	0.27	0.9	0.84	0.22	1.01	-0.75	-0.87	1.13	0.14	0.16	0.13	1.16
1.35	0.31	0.36	1.44	0.47	1.07	1	0.42	0.79	0.32	0.36	0.87	0.88	0.36	0.34	1.9
0.47	0.51	0.57	0.51	0.86	0.51	0.46	0.8	-1.3	0.02	0.01	-1.52	1.12	0.74	0.74	2.14
0.04	0.45	0.51	0.05	0.75	0.53	0.48	0.69	-1.29	-1.17	-1.35	-1.51	1.3	0.55	0.54	2.32
-0.96	-0.91	-0.93	-1.01	-1.12	-2.04	-2.02	-1.13	-1.68	-0.03	-0.05	-1.95	-0.96	-0.86	-0.95	0.06
-0.99	0.04	0.07	-1.04	0.65	-0.02	-0.06	0.59	0.1	0.05	0.05	0.08	0.23	0.13	0.09	1.25
-1.29	-0.37	-0.36	-1.35	0.3	-0.07	-0.11	0.25	-0.36	0.25	0.28	-0.44	0.07	0.38	0.36	1.09
-1.16	-0.88	-0.9	-1.22	0.34	-0.72	-0.74	0.29	-0.3	-0.64	-0.74	-0.37	-1.53	0.18	0.15	-0.51
-0.7	0.04	0.07	-0.73	0.17	0.78	0.72	0.13	0.13	-0.67	-0.78	0.12	0.24	0.13	0.09	1.26
-0.86	-0.14	-0.12	-0.9	0.24	-0.59	-0.61	0.19	-0.02	-1.61	-1.85	-0.05	0.22	0.16	0.13	1.24
-0.93	0.07	0.11	-0.97	0.31	0.24	0.19	0.26	0.24	-1.09	-1.26	0.24	-0.23	0.01	-0.03	0.79
-0.06	-0.74	-0.75	-0.05	0.34	0.05	0.01	0.29	-0.02	-1.14	-1.32	-0.05	0.52	0.54	0.53	1.54
-0.69	-0.29	-0.27	-0.72	0.27	-0.08	-0.12	0.22	0.3	-2.26	-2.6	0.31	0.01	-0.76	-0.84	1.03
-1.16	-0.04	-0.01	-1.22	0.65	-0.02	-0.06	0.59	-0.11	0.05	0.05	-0.16	0.24	0.13	0.09	1.26
-0.99	0.05	0.08	-1.04	0.63	-0.02	-0.06	0.57	0.1	0.09	0.09	0.08	0.31	0.13	0.09	1.33
-0.65	-0.74	-0.75	-0.68	-0.62	-2.92	-2.88	-0.64	-1.56	-2.07	-2.38	-1.81	-0.07	0.35	0.33	0.95
-0.9	-0.39	-0.38	-0.94	0.47	-0.16	-0.19	0.42	-0.36	0.25	0.28	-0.44	0.2	0.13	0.09	1.22
-1.03	-0.07	-0.04	-1.08	-0.93	-0.12	-0.16	-0.94	-0.21	-1.21	-1.4	-0.27	-1.29	-1.52	-1.65	-0.27
2.18	0.14	0.18	2.32	0.2	1.02	0.95	0.15	-0.79	-0.37	-0.44	-0.93	-0.07	0.67	0.67	0.95
-0.69	-0.85	-0.87	-0.72	-1.73	-0.44	-0.47	-1.72	-0.38	0.35	0.39	-0.46	0.04	0.13	0.09	1.06
-1.16	-0.26	-0.24	-1.22	0.64	-0.26	-0.29	0.58	-0.27	-0.09	-0.11	-0.34	-1.11	0.13	0.09	-0.09
-0.06	-0.75	-0.76	-0.05	0.34	-1	-1.01	0.29	-0.19	-1.11	-1.28	-0.25	0.52	0.49	0.48	1.54
-1.16	-0.38	-0.37	-1.22	0.3	-0.55	-0.57	0.25	-0.51	-0.55	-0.64	-0.61	0.52	0.13	0.1	1.54

-0.9	0.05	0.08	-0.94	0.23	0.76	0.7	0.18	-0.2	-1.8	-2.07	-0.26	0.29	0.16	0.13	1.31
-0.9	-0.28	-0.26	-0.94	-0.02	0.65	0.59	-0.06	-0.21	-1.8	-2.07	-0.27	0.29	0.14	0.11	1.31
-1.16	-0.29	-0.27	-1.22	0.35	0.04	0	0.3	0.32	-0.16	-0.2	0.34	0.14	0.18	0.15	1.16
-0.69	-0.29	-0.27	-0.72	0.48	-0.08	-0.12	0.43	0.32	-1.07	-1.24	0.34	0.07	0.31	0.29	1.09
-0.9	0.03	0.06	-0.94	0.23	0.78	0.72	0.18	-1.27	-0.24	-0.29	-1.48	0.29	0.16	0.13	1.31
-1.16	-0.29	-0.27	-1.22	0.34	-0.08	-0.12	0.29	-0.4	-0.72	-0.84	-0.49	0.09	0.18	0.15	1.11
-0.69	-0.37	-0.36	-0.72	0.48	-0.07	-0.11	0.43	-0.36	-0.62	-0.72	-0.44	-0.07	0.35	0.33	0.95
-1.13	-0.35	-0.34	-1.19	0.62	-0.07	-0.11	0.56	-0.63	0.15	0.16	-0.75	0.28	0.13	0.09	1.3
-1.37	-0.37	-0.36	-1.44	-0.31	-0.07	-0.11	-0.34	-0.37	0.24	0.26	-0.45	-1.48	-1.04	-1.14	-0.46
-0.95	-0.35	-0.34	-1	-0.78	-0.02	-0.06	-0.8	0.28	-0.64	-0.74	0.29	0.29	-1.04	-1.14	1.31
-0.71	-1.05	-1.08	-0.74	0.18	0.7	0.64	0.13	0.28	-1.57	-1.81	0.29	0.29	-1.04	-1.14	1.31
-0.95	0.04	0.07	-1	0.36	0.6	0.54	0.31	-0.01	-0.87	-1.01	-0.04	0.34	-1.14	-1.25	1.36
-0.06	-0.14	-0.12	-0.05	0.37	-0.83	-0.85	0.32	-1.39	-0.86	-0.99	-1.62	0.22	0.55	0.54	1.24
-1.16	0.07	0.11	-1.22	0.49	0.24	0.19	0.44	0.24	-0.97	-1.12	0.24	0.29	0.13	0.09	1.31
-1.16	-0.13	-0.11	-1.22	0.61	0.18	0.14	0.55	0.25	-1.57	-1.81	0.26	0.16	0.19	0.16	1.18
-1.16	0.07	0.11	-1.22	0.65	0.24	0.19	0.59	0.25	-1.57	-1.81	0.26	0.29	0.13	0.09	1.31
-1.15	-0.55	-0.55	-1.21	-0.32	0.24	0.19	-0.35	-1.39	-1.13	-1.3	-1.62	0.29	0.15	0.12	1.31
-1.16	-0.81	-0.83	-1.22	0.65	-3.17	-3.12	0.59	-0.18	-0.62	-0.72	-0.24	0.24	0.13	0.09	1.26
-1.16	-0.46	-0.46	-1.22	0.65	-0.31	-0.34	0.59	-0.41	-0.03	-0.05	-0.5	0.27	0.13	0.09	1.29
-0.7	-1.3	-1.34	-0.73	-1.87	-0.42	-0.45	-1.86	-2.14	-1.15	-1.33	-2.48	-1.21	-0.29	-0.35	-0.19
-0.38	-0.78	-0.79	-0.39	-1.27	-0.65	-0.67	-1.27	0.21	-0.05	-0.07	0.21	-0.58	-1.14	-1.25	0.44
-3.29	-0.91	-0.93	-3.47	-2.14	-0.35	-0.38	-2.12	-1.39	-0.33	-0.39	-1.62	-1.53	0.13	0.1	-0.51
-1.4	-0.88	-0.9	-1.47	-0.88	-0.86	-0.87	-0.9	-0.82	-0.22	-0.26	-0.97	-0.4	-0.29	-0.35	0.62
-0.54	-0.57	-0.57	-0.56	-0.6	-0.71	-0.73	-0.62	-1.93	-0.74	-0.86	-2.24	-0.24	-1.15	-1.26	0.78
-0.66	-0.81	-0.83	-0.69	-0.37	-0.26	-0.29	-0.4	-2.16	-1.11	-1.28	-2.5	-0.96	-0.88	-0.97	0.06

-3.29	-0.88	-0.9	-3.47	-2.14	-0.65	-0.67	-2.12	-1.39	-0.16	-0.19	-1.62	-1.53	-0.95	-1.05	-0.51
-0.54	-1.01	-1.04	-0.56	-0.91	-1.87	-1.86	-0.92	-0.4	-1.48	-1.7	-0.49	-1.29	-0.39	-0.45	-0.27
-0.89	-1.07	-1.1	-0.93	-1.19	-0.97	-0.98	-1.2	-0.27	-0.44	-0.52	-0.34	-0.07	-3.5	-3.74	0.95
-0.7	-1.06	-1.09	-0.73	-1.63	-0.05	-0.09	-1.62	-0.28	-0.58	-0.67	-0.35	0.14	-0.77	-0.86	1.16
-0.74	-0.78	-0.79	-0.77	-1.42	-1.14	-1.15	-1.42	0.09	-0.39	-0.46	0.07	0.1	-0.7	-0.78	1.12
0.05	-0.87	-0.89	0.06	-0.95	-0.65	-0.67	-0.96	0.68	-0.24	-0.29	0.75	-1.28	-0.95	-1.05	-0.26
-0.84	-0.82	-0.84	-0.88	-2.64	-1.21	-1.21	-2.61	0.16	-0.05	-0.07	0.15	-0.53	-0.42	-0.49	0.49
-1.1	-0.73	-0.74	-1.15	-0.64	-0.72	-0.74	-0.66	-0.21	-0.71	-0.82	-0.27	-0.31	-0.45	-0.52	0.71
-1.35	-0.41	-0.4	-1.42	-1.01	-0.01	-0.05	-1.02	-1.6	-0.9	-1.04	-1.86	-0.24	-0.27	-0.33	0.78
-1.75	-1.01	-1.04	-1.84	-2.03	-0.83	-0.85	-2.01	0.23	-0.62	-0.72	0.23	0.03	-1.17	-1.28	1.05
-2.75	-1.11	-1.14	-2.9	-1.86	-2.14	-2.12	-1.85	0.24	0.01	0	0.24	-0.29	-0.59	-0.66	0.73
-1.43	-0.63	-0.63	-1.5	-0.31	-0.75	-0.77	-0.34	-0.58	-0.98	-1.13	-0.69	-1.04	-0.34	-0.4	-0.02
-0.21	-0.68	-0.69	-0.21	-0.86	-1.21	-1.21	-0.88	-0.37	-0.65	-0.76	-0.45	-0.7	-0.63	-0.71	0.32
0.04	-0.56	-0.56	0.05	-0.98	-2.4	-2.37	-0.99	0.25	-1.12	-1.29	0.26	-0.23	-1.22	-1.33	0.79
-1.23	-0.4	-0.39	-1.29	-1.05	-1.37	-1.37	-1.06	-1.04	0.14	0.15	-1.22	-0.34	-0.76	-0.85	0.68
-1.61	-0.48	-0.48	-1.69	-1.89	0.03	-0.01	-1.88	-1.31	-0.96	-1.11	-1.53	-0.51	-0.23	-0.28	0.51
-0.71	-0.8	-0.82	-0.74	-0.37	0	-0.04	-0.4	-1.8	-0.13	-0.16	-2.09	-0.09	-1.16	-1.27	0.93
-3.29	-0.75	-0.76	-3.47	-0.99	-1.54	-1.54	-1	-2.12	-0.52	-0.61	-2.46	-0.21	-1.2	-1.31	0.81
-0.83	-0.8	-0.82	-0.87	-1.18	-1.13	-1.14	-1.19	-0.93	-0.27	-0.32	-1.09	-0.31	-0.76	-0.85	0.71
-0.08	-0.72	-0.73	-0.07	-0.72	-0.63	-0.65	-0.74	-0.25	-0.5	-0.58	-0.32	-0.48	-0.37	-0.43	0.54
-0.94	-0.73	-0.74	-0.98	-0.9	-1.59	-1.58	-0.91	-0.38	-0.24	-0.29	-0.46	-0.77	-1.87	-2.02	0.25
-1.11	-1.23	-1.27	-1.16	-0.78	-0.86	-0.87	-0.8	0.14	-0.09	-0.11	0.13	-0.34	-1.15	-1.26	0.68
-1.23	-0.59	-0.59	-1.29	-1.87	-1.14	-1.15	-1.86	-0.79	-0.15	-0.18	-0.93	-1.28	-1.12	-1.23	-0.26
-1.15	-0.45	-0.44	-1.21	-2.17	-0.21	-0.24	-2.15	-1.51	-0.02	-0.04	-1.76	-0.4	-0.83	-0.92	0.62
-0.87	-0.92	-0.94	-0.91	-1.79	-0.23	-0.26	-1.78	-0.48	-0.25	-0.3	-0.58	-1.32	-0.46	-0.53	-0.3

-0.8	-0.9	-0.92	-0.84	-1.59	-0.01	-0.05	-1.59	-0.15	-1.77	-2.04	-0.2	-0.87	-1.17	-1.28	0.15
-1.09	-0.44	-0.43	-1.14	-0.82	-1.07	-1.08	-0.84	-1.72	-0.51	-0.59	-2	-0.64	-1.18	-1.29	0.38
-1.24	-0.8	-0.81	-1.3	-1	-0.66	-0.68	-1.01	-2.73	-2.57	-2.95	-3.15	-0.71	-2.77	-2.97	0.31
-1.58	-0.62	-0.62	-1.66	-0.05	-2.17	-2.15	-0.09	-2.36	-0.23	-0.27	-2.73	-0.09	-1	-1.1	0.93
-2.6	-0.38	-0.37	-2.74	-0.62	-0.77	-0.79	-0.64	-0.26	-1.31	-1.51	-0.33	0.09	-1.35	-1.47	1.11
-0.2	-0.69	-0.7	-0.2	-1.09	-1.47	-1.47	-1.1	-0.83	-0.33	-0.39	-0.98	-1.04	-0.67	-0.75	-0.02
-1.3	-1.24	-1.28	-1.37	-1.04	-0.35	-0.38	-1.05	-1.56	-0.47	-0.55	-1.81	-1.28	-1.13	-1.24	-0.26
-2.45	-2.75	-2.88	-2.58	-1.91	-0.96	-0.97	-1.9	-1.07	-0.76	-0.88	-1.25	-0.96	-0.41	-0.47	0.06
-0.8	-1.17	-1.21	-0.84	-1.87	-2.23	-2.21	-1.86	-1.06	-1.11	-1.28	-1.24	-0.28	-0.47	-0.54	0.74
-2.2	-0.8	-0.81	-2.32	-0.73	-1.1	-1.11	-0.75	-1.9	-0.62	-0.72	-2.2	-0.96	-0.53	-0.6	0.06
-1.59	-0.65	-0.66	-1.67	-0.66	-0.66	-0.68	-0.68	0.2	-0.85	-0.98	0.2	-0.37	-1.01	-1.11	0.65
-0.59	-0.98	-1.01	-0.61	-0.52	-2.24	-2.22	-0.55	0	-2.13	-2.45	-0.03	0.1	-1.14	-1.25	1.12
-0.82	-0.86	-0.88	-0.86	-0.92	-1.3	-1.3	-0.93	0.05	-1.69	-1.95	0.03	-0.11	-0.96	-1.06	0.91
-1.01	-1.05	-1.08	-1.06	-0.82	-0.65	-0.67	-0.84	-1.14	-1.1	-1.27	-1.33	-0.82	-1.12	-1.22	0.2
-0.35	-2.75	-2.88	-0.36	-0.7	-0.43	-0.46	-0.72	-2.65	-0.84	-0.97	-3.06	-0.03	-1.17	-1.28	0.99
-3.29	-0.9	-0.92	-3.47	-2.14	-1.54	-1.54	-2.12	-1.39	-1.21	-1.4	-1.62	-1.53	-1.29	-1.4	-0.51
-1.45	-1.09	-1.12	-1.52	0.05	-0.48	-0.51	0.01	-1.71	-0.44	-0.52	-1.99	-0.64	-2.18	-2.34	0.38
-2.81	-0.92	-0.94	-2.96	-0.76	-0.78	-0.8	-0.78	-0.31	-0.37	-0.43	-0.38	-0.29	-0.74	-0.82	0.73
-0.93	-0.8	-0.81	-0.97	-1.47	-0.51	-0.53	-1.47	0.46	-0.1	-0.13	0.5	-1.31	-1.17	-1.28	-0.29
-1.16	-0.59	-0.59	-1.22	-1.43	-0.56	-0.58	-1.43	0.72	-1.51	-1.74	0.79	1.68	-0.36	-0.42	2.7
0.53	-0.8	-0.82	0.57	0.61	-1.09	-1.1	0.55	1.13	1.2	1.36	1.26	1.01	0.72	0.72	2.03
0.31	-0.72	-0.73	0.34	-1.55	-2.31	-2.28	-1.55	-0.16	-0.35	-0.41	-0.21	-0.07	-0.15	-0.2	0.95
-1.1	-0.81	-0.83	-1.15	-0.63	-0.37	-0.4	-0.65	0.21	-1.11	-1.28	0.21	-0.97	-1.11	-1.21	0.05
-1.13	-1.19	-1.23	-1.19	-1.86	-0.45	-0.48	-1.85	0.19	-0.34	-0.4	0.19	-0.19	0.27	0.24	0.83
-0.68	-1.07	-1.1	-0.71	-1.17	-0.43	-0.46	-1.18	-0.21	-1.07	-1.24	-0.27	-0.73	-0.68	-0.76	0.29

-0.47	-0.67	-0.68	-0.49	-1.43	-0.58	-0.6	-1.43	0.38	-0.16	-0.19	0.4	-0.35	-1.16	-1.27	0.67
-1.46	-2.75	-2.88	-1.53	-0.7	-0.18	-0.21	-0.72	-2.65	-0.79	-0.92	-3.06	-0.03	-1.16	-1.27	0.99
-1.91	-0.88	-0.9	-2.01	-0.7	-0.65	-0.67	-0.72	-2.65	-1.62	-1.86	-3.06	-0.03	-0.95	-1.05	0.99
-3.26	-0.54	-0.54	-3.44	-1.86	-0.52	-0.54	-1.85	-1.31	-0.34	-0.4	-1.53	-0.41	-0.21	-0.26	0.61
-1.79	-0.53	-0.53	-1.88	-0.34	0.13	0.09	-0.37	-0.82	-0.86	-1	-0.97	-1.38	-0.93	-1.02	-0.36
-1.02	-0.98	-1.01	-1.07	-0.71	-0.82	-0.84	-0.73	-2.06	0.21	0.23	-2.39	-0.52	-3.08	-3.29	0.5
0.05	-1.75	-1.82	0.06	-0.44	-0.15	-0.18	-0.47	0.15	-1.09	-1.26	0.14	-0.53	-1.18	-1.29	0.49
-1.25	-0.6	-0.6	-1.31	-0.54	-1.02	-1.03	-0.56	-1.07	-0.37	-0.44	-1.25	-0.96	-0.95	-1.05	0.06
-1.64	-0.84	-0.86	-1.73	-1.86	-1.1	-1.11	-1.85	-0.4	-0.36	-0.42	-0.49	-0.24	-0.17	-0.22	0.78
-0.54	-0.35	-0.34	-0.56	-0.88	-0.9	-0.91	-0.9	-1.38	-1.08	-1.25	-1.61	-0.24	-1.17	-1.28	0.78
-1.03	-0.89	-0.91	-1.08	-0.86	-0.56	-0.58	-0.88	-2.02	-0.23	-0.28	-2.34	-1.73	-0.86	-0.95	-0.71
-0.57	-1.13	-1.16	-0.59	-0.49	-0.42	-0.45	-0.52	-0.27	0.09	0.09	-0.34	-0.12	-1.19	-1.3	0.9
-1.3	-0.63	-0.64	-1.37	-1.86	-0.17	-0.2	-1.85	-0.83	-0.54	-0.63	-0.98	-0.2	-1.22	-1.33	0.82
-1.31	-0.88	-0.9	-1.38	-0.82	-1.34	-1.34	-0.84	-1.34	-0.31	-0.37	-1.56	-0.3	-1.21	-1.32	0.72
-1.32	-0.5	-0.5	-1.39	-2.06	-0.06	-0.1	-2.04	-0.63	-0.5	-0.58	-0.75	-0.71	-0.65	-0.73	0.31
-0.82	-1.43	-1.48	-0.86	-1.28	-0.65	-0.67	-1.28	-2.65	-0.16	-0.19	-3.06	-0.29	-0.95	-1.05	0.73
0.47	0.29	0.34	0.51	0.69	0.46	0.41	0.63	0.22	0.33	0.37	0.22	1.18	0.63	0.62	2.2
0.5	-0.22	-0.2	0.54	-0.15	0.66	0.6	-0.19	0.96	0.88	1	1.07	1.63	-0.3	-0.36	2.65
-0.14	-0.06	-0.03	-0.14	-0.63	0.52	0.47	-0.65	0.73	-0.52	-0.61	0.81	0.81	-1.02	-1.12	1.83
0.07	0.16	0.2	0.08	-0.07	0.27	0.22	-0.11	-0.51	-2.18	-2.5	-0.61	-0.69	-1.12	-1.22	0.33
-0.72	0.08	0.12	-0.75	0.31	1.16	1.09	0.26	-0.37	0.52	0.58	-0.45	1.12	0.47	0.45	2.14
0.06	0.35	0.4	0.07	0.76	-0.58	-0.6	0.7	-0.7	0.69	0.78	-0.83	1.28	0.9	0.91	2.3
0.58	0.31	0.36	0.62	-0.1	0.78	0.72	-0.14	0.8	0.69	0.78	0.89	0.32	0.52	0.51	1.34
1.11	-0.44	-0.43	1.18	0.73	1.15	1.08	0.67	0.72	0.68	0.77	0.79	0.57	0.48	0.46	1.59
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07

0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.61	1.49	1.53	1.63
0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	0.98	0.93	0.94	2
-0.87	0.34	0.39	-0.91	-0.18	0.59	0.53	-0.21	-1.03	0.91	1.03	-1.21	0.32	0.74	0.74	1.34
0.15	0.4	0.45	0.17	0.35	-0.46	-0.49	0.3	-0.16	-0.15	-0.18	-0.21	0.42	-1.11	-1.21	1.44
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.23	-0.09	-0.12	1.38	1.08	-1.12	-1.22	2.1
0.31	0.79	0.87	0.34	0.38	-1.38	-1.38	0.33	1.05	-0.09	-0.12	1.17	0.83	-1.12	-1.22	1.85
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.21	-0.09	-0.12	1.35	0.8	-0.8	-0.89	1.82
-1.36	-0.8	-0.82	-1.43	-0.9	-1.36	-1.36	-0.91	0.46	-1.13	-1.3	0.5	-0.1	-1.19	-1.3	0.92
-1.87	-0.98	-1	-1.97	-0.5	-0.41	-0.44	-0.53	-0.87	-0.89	-1.03	-1.03	-0.87	-1.3	-1.41	0.15
-0.48	-1.19	-1.23	-0.5	-0.56	-1.17	-1.18	-0.58	0.3	-1.08	-1.25	0.31	-1.36	-0.22	-0.27	-0.34
-1.89	-0.7	-0.71	-1.99	-2.73	-1.39	-1.39	-2.69	-1.56	-0.89	-1.03	-1.81	-0.86	-0.57	-0.64	0.16
-1.82	-0.59	-0.59	-1.92	-0.71	-1.42	-1.42	-0.73	-1.84	-0.73	-0.85	-2.13	-0.21	-1.38	-1.5	0.81
-1.41	-1.09	-1.12	-1.48	-0.61	-1.53	-1.53	-0.63	-1.65	-1.11	-1.28	-1.92	-1.96	-1.17	-1.28	-0.94
-1.78	-0.43	-0.42	-1.87	-0.74	-0.81	-0.83	-0.76	-1.2	-0.72	-0.83	-1.4	-0.35	-1.2	-1.31	0.67
-0.73	-0.95	-0.97	-0.76	-0.25	-1.13	-1.14	-0.28	-1.65	-1.8	-2.07	-1.92	-0.66	-1.19	-1.3	0.36
0.91	1.09	1.18	0.97	0.18	0.61	0.55	0.13	0.37	0.78	0.88	0.39	0.99	1.18	1.2	2.01
0.65	1.15	1.25	0.7	0.16	1.24	1.17	0.12	1.57	1.35	1.53	1.77	0.89	0.75	0.75	1.91
0.67	1.55	1.67	0.72	1.13	1.24	1.17	1.06	1.58	1	1.13	1.78	1.4	0.89	0.9	2.42
0.04	-0.04	-0.01	0.05	0.41	-0.27	-0.3	0.36	0.99	0.25	0.27	1.1	1.32	-0.83	-0.92	2.34
0.93	1.2	1.3	0.99	0.76	-0.24	-0.27	0.7	1.08	0.91	1.03	1.21	0.9	1.02	1.04	1.92

0.1	0.83	0.91	0.12	1.58	1.62	1.54	1.5	1.4	1.2	1.36	1.57	1.55	1.02	1.03	2.57
0.3	0.91	0.99	0.33	0.65	0.73	0.67	0.59	0.27	0.71	0.8	0.28	0.48	0.9	0.91	1.5
1.75	0.58	0.65	1.86	-0.15	0.78	0.72	-0.19	0.39	0.59	0.66	0.42	1.39	-1.18	-1.29	2.41
1.85	0.53	0.59	1.97	0.34	1.14	1.07	0.29	0.82	0.98	1.11	0.91	0.58	0.75	0.75	1.6
-0.18	1.85	1.99	-0.18	1.08	1.21	1.14	1.01	1.54	-0.51	-0.59	1.73	1.35	1.28	1.31	2.37
0.47	1	1.09	0.51	0.63	2.63	2.52	0.57	0.36	0.95	1.07	0.38	0.73	0.84	0.84	1.75
0.09	0.99	1.08	0.11	1.13	0.65	0.59	1.06	1.4	0.74	0.84	1.57	1.21	0.74	0.74	2.23
-0.08	1.52	1.64	-0.07	0.67	0.61	0.55	0.61	0.75	0.72	0.81	0.83	0.7	0.81	0.81	1.72
0.37	0.74	0.81	0.4	0.7	0.28	0.23	0.64	0.86	1.16	1.32	0.95	0.83	0.8	0.8	1.85
0.02	0.7	0.77	0.03	0.69	-0.84	-0.86	0.63	0.64	0.78	0.88	0.7	0.86	0.28	0.25	1.88
0.62	0.51	0.57	0.67	0.57	0.77	0.71	0.51	0.93	0.47	0.53	1.03	0.97	0.11	0.07	1.99
-0.45	-0.34	-0.33	-0.47	0.61	-0.77	-0.79	0.55	1.1	0.66	0.74	1.23	1.14	0.62	0.61	2.16
0.63	0.56	0.62	0.68	1.05	-1.79	-1.78	0.98	0.94	0.99	1.12	1.05	0.41	-0.35	-0.41	1.43
0.47	0.92	1.01	0.51	0.62	1.21	1.14	0.56	0.77	0.91	1.03	0.85	0.53	0.85	0.86	1.55
0.92	0.75	0.83	0.98	0.48	0.51	0.46	0.43	0.78	0.9	1.02	0.86	0.55	0.65	0.64	1.57
-0.15	0.26	0.31	-0.15	1.32	0.89	0.83	1.24	0.87	1.18	1.34	0.97	0.69	0.96	0.97	1.71
0.08	0.97	1.06	0.09	0.08	0.86	0.8	0.04	0.67	0.47	0.53	0.74	-0.32	0.49	0.47	0.7
0.7	0.72	0.79	0.75	0.81	0.89	0.83	0.75	0.68	0.53	0.6	0.75	0.49	0.72	0.72	1.51
0.45	0.07	0.11	0.49	0.57	-0.41	-0.44	0.51	0.36	0.85	0.96	0.38	0.68	0.1	0.06	1.7
1.31	3.19	3.41	1.4	0.05	0.71	0.65	0.01	1.61	0.61	0.69	1.81	1.72	0.88	0.89	2.74
0.92	0.78	0.86	0.98	1.29	1.11	1.04	1.21	1.17	0.73	0.82	1.31	1.34	0.92	0.93	2.36
-0.55	-0.05	-0.02	-0.57	0.49	0	-0.04	0.44	-0.31	0.75	0.85	-0.38	0.49	0.48	0.46	1.51
0.45	-0.12	-0.1	0.49	0.5	0.33	0.28	0.45	0.92	0.95	1.08	1.02	-0.1	0.34	0.32	0.92
-0.22	0.27	0.32	-0.22	-0.93	0.23	0.18	-0.94	0.26	0.47	0.53	0.27	-0.2	0.37	0.35	0.82
-0.45	-0.25	-0.23	-0.47	-0.5	0.94	0.87	-0.53	-0.85	0.7	0.79	-1	0.53	0.24	0.21	1.55

0.14	0.52	0.58	0.16	0.33	1.55	1.47	0.28	0.77	0.6	0.68	0.85	0.48	0.8	0.8	1.5
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.02	-1.17	-1.28	2.04
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.56	0.29	0.26	1.58
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.61	0.58	0.57	1.63
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.56	1.49	1.53	1.58
0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	1.02	0.93	0.94	2.04
-0.87	0.34	0.39	-0.91	-0.18	0.59	0.53	-0.21	-1.03	0.91	1.03	-1.21	0.32	0.74	0.74	1.34
0.15	0.4	0.45	0.17	0.35	-0.46	-0.49	0.3	-0.16	-0.15	-0.18	-0.21	0.42	-1.11	-1.21	1.44
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.23	-0.09	-0.12	1.38	1.03	-1.12	-1.22	2.05
0.31	0.79	0.87	0.34	0.38	-1.38	-1.38	0.33	1.05	-0.09	-0.12	1.17	0.79	-1.12	-1.22	1.81
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.21	-0.09	-0.12	1.35	0.76	-0.8	-0.89	1.78
-1.36	-0.8	-0.82	-1.43	-0.9	-1.36	-1.36	-0.91	0.46	-1.13	-1.3	0.5	-0.1	-1.19	-1.3	0.92
-1.87	-0.98	-1	-1.97	-0.5	-0.41	-0.44	-0.53	-0.87	-0.89	-1.03	-1.03	-0.87	-1.3	-1.41	0.15
-0.48	-1.19	-1.23	-0.5	-0.56	-1.17	-1.18	-0.58	0.3	-1.08	-1.25	0.31	-0.96	-0.22	-0.27	0.06
-1.89	-0.7	-0.71	-1.99	-2.73	-1.39	-1.39	-2.69	-1.56	-0.89	-1.03	-1.81	-0.86	-0.57	-0.64	0.16
0.1	-0.32	-0.31	0.12	-0.12	-1.07	-1.08	-0.16	0.25	-3.14	-3.6	0.26	-1.12	-0.9	-0.99	-0.1
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.02	-1.17	-1.28	2.04
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.71	0.67	0.66	1.73
-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.56	1.49	1.53	1.58

0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	0.98	0.93	0.94	2
-0.87	0.34	0.39	-0.91	-0.18	0.59	0.53	-0.21	-1.03	0.91	1.03	-1.21	0.38	0.74	0.74	1.4
0.15	0.4	0.45	0.17	0.35	-0.46	-0.49	0.3	-0.16	-0.15	-0.18	-0.21	0.42	-1.11	-1.21	1.44
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.23	-0.09	-0.12	1.38	1.08	-1.12	-1.22	2.1
0.31	0.79	0.87	0.34	0.38	-1.38	-1.38	0.33	1.05	-0.09	-0.12	1.17	0.83	-1.12	-1.22	1.85
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.21	-0.09	-0.12	1.35	0.76	-0.8	-0.89	1.78
-1.36	-0.8	-0.82	-1.43	-0.9	-1.36	-1.36	-0.91	0.46	-1.13	-1.3	0.5	-0.1	-1.19	-1.3	0.92
-1.87	-0.98	-1	-1.97	-0.5	-0.41	-0.44	-0.53	-0.87	-0.89	-1.03	-1.03	-0.87	-1.3	-1.41	0.15
-0.48	-1.19	-1.23	-0.5	-0.56	-1.17	-1.18	-0.58	0.3	-1.08	-1.25	0.31	-1.36	-0.22	-0.27	-0.34
-1.89	-0.7	-0.71	-1.99	-2.73	-1.39	-1.39	-2.69	-1.56	-0.89	-1.03	-1.81	-0.86	-0.57	-0.64	0.16
0.1	-0.32	-0.31	0.12	-0.12	-1.07	-1.08	-0.16	0.25	-3.14	-3.6	0.26	-1.55	-0.9	-0.99	-0.53
0.37	0.34	0.39	0.4	1.19	0.85	0.79	1.12	0.43	1.11	1.26	0.46	0.94	0.77	0.77	1.96
1.27	-3.61	-3.79	1.35	0.44	-1.54	-1.54	0.39	0.49	1.18	1.34	0.53	0.82	0.51	0.5	1.84
0.38	0.58	0.65	0.41	0.38	0.09	0.05	0.33	0.63	0.74	0.84	0.69	0.17	0.04	0	1.19
0.51	0.44	0.5	0.55	0.73	1.03	0.96	0.67	1.08	0.77	0.87	1.21	0.71	0.76	0.76	1.73
-0.84	0.76	0.84	-0.88	0.74	0.95	0.88	0.68	0.49	0.51	0.57	0.53	0.23	0.21	0.18	1.25
0.09	0.77	0.85	0.11	1.39	0.63	0.57	1.31	0.69	0.88	1	0.76	0.77	0.39	0.37	1.79
0.52	0.95	1.04	0.56	1.72	0.73	0.67	1.63	-0.27	1.87	2.13	-0.34	0.27	0.96	0.97	1.29
0.42	-0.33	-0.32	0.45	1.11	0.84	0.78	1.04	0.49	0.92	1.04	0.53	1.23	0.14	0.11	2.25
0.31	1.03	1.12	0.34	0.75	1.37	1.29	0.69	0.81	0.98	1.11	0.9	0.94	0.6	0.59	1.96
0.61	0.73	0.8	0.66	0.92	0.45	0.4	0.85	0.25	0.49	0.55	0.26	-1.55	0.36	0.34	-0.53
-0.63	-1.07	-1.1	-0.66	0.32	-1.76	-1.75	0.27	0.1	-0.51	-0.59	0.08	-1.32	-0.2	-0.25	-0.3
-0.74	-0.32	-0.31	-0.77	-0.44	-2.55	-2.52	-0.47	0.54	0.18	0.2	0.59	-1.51	0.07	0.03	-0.49
-0.53	-1.11	-1.14	-0.55	0.2	-1.71	-1.7	0.15	-0.11	0.09	0.09	-0.16	-0.39	0.09	0.05	0.63

-0.48	-1.15	-1.18	-0.5	-0.4	-1.36	-1.36	-0.43	0.4	-0.37	-0.43	0.43	-1.13	-0.26	-0.32	-0.11
-0.72	-0.95	-0.97	-0.75	-0.94	-1.11	-1.12	-0.95	-0.29	-0.3	-0.35	-0.36	-1.33	-0.47	-0.54	-0.31
-1.01	-1.05	-1.08	-1.06	-0.37	-1.37	-1.37	-0.4	0.21	-0.53	-0.62	0.21	-0.58	-0.27	-0.33	0.44
-0.17	-1.06	-1.09	-0.17	-0.62	-1.31	-1.31	-0.64	0.21	0.56	0.63	0.21	-1.54	-1.32	-1.44	-0.52
-0.58	-0.87	-0.89	-0.6	-1.86	-0.42	-0.45	-1.85	0.01	-2.01	-2.31	-0.02	-1.17	-0.2	-0.25	-0.15
-0.02	-0.77	-0.78	-0.01	0.88	-1.4	-1.4	0.82	-1.33	-0.4	-0.47	-1.55	-1.31	-0.29	-0.35	-0.29
0.2	-1.28	-1.32	0.22	-0.58	-3.11	-3.06	-0.6	0.28	0.32	0.36	0.29	0.35	0.27	0.24	1.37
0.36	-0.96	-0.98	0.39	-0.81	0.18	0.14	-0.83	0.49	0.74	0.83	0.53	0.07	0.3	0.27	1.09
-0.53	-0.06	-0.03	-0.55	-0.79	-0.17	-0.2	-0.81	0.3	0.69	0.78	0.31	-0.82	0.98	0.99	0.2
-0.27	1.5	1.62	-0.28	0.24	1.02	0.95	0.19	-0.26	1.17	1.33	-0.33	0.14	0.78	0.78	1.16
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.61	1.49	1.53	1.63
0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	0.98	0.93	0.94	2
-0.87	0.34	0.39	-0.91	-0.18	0.59	0.53	-0.21	-1.03	0.91	1.03	-1.21	0.32	0.74	0.74	1.34
0.15	0.4	0.45	0.17	0.35	-0.46	-0.49	0.3	-0.16	-0.15	-0.18	-0.21	0.42	-1.11	-1.21	1.44
1.04	0.25	0.3	1.11	1.08	0.73	0.67	1.01	0.75	0.51	0.57	0.83	0.14	0.79	0.79	1.16
-0.93	0.67	0.74	-0.97	0.11	-0.5	-0.52	0.07	0.2	-0.23	-0.28	0.2	0.9	-0.3	-0.36	1.92
0.81	1.02	1.11	0.87	0.87	0.78	0.72	0.81	-0.86	-0.18	-0.22	-1.01	-0.54	1.04	1.06	0.48
0.19	0.75	0.83	0.21	0.91	1.08	1.01	0.84	0.33	0.83	0.94	0.35	0.8	0.74	0.74	1.82
-0.05	0.74	0.81	-0.04	0.92	0.21	0.17	0.85	-1.61	0.74	0.84	-1.87	0.56	0.66	0.65	1.58

-0.54	0.04	0.07	-0.56	0.82	0.88	0.82	0.76	0.48	0.77	0.87	0.52	0.39	0.62	0.61	1.41
0	-0.29	-0.27	0.01	0.72	-0.05	-0.09	0.66	-1.17	0.55	0.62	-1.37	0.81	0.72	0.72	1.83
0.77	0.58	0.65	0.82	0.72	0.77	0.71	0.66	0.6	0.02	0.01	0.66	1.12	0.58	0.57	2.14
-0.14	0.77	0.85	-0.14	0.46	0.87	0.81	0.41	0.9	0.7	0.79	1	1.26	0.55	0.54	2.28
0.94	0.61	0.68	1	0.89	1.03	0.96	0.83	0.68	0.83	0.94	0.75	0.84	0.13	0.1	1.86
-0.12	1.2	1.3	-0.12	0.74	0.31	0.26	0.68	1.49	0.91	1.03	1.67	1.11	0.83	0.83	2.13
0.61	0.73	0.8	0.66	0.92	0.45	0.4	0.85	0.25	0.49	0.55	0.26	-1.55	0.36	0.34	-0.53
-0.63	-1.07	-1.1	-0.66	0.32	-1.76	-1.75	0.27	0.1	-0.51	-0.59	0.08	-1.32	-0.2	-0.25	-0.3
-0.74	-0.32	-0.31	-0.77	-0.44	-2.55	-2.52	-0.47	0.54	0.18	0.2	0.59	-1.51	0.07	0.03	-0.49
-0.53	-1.11	-1.14	-0.55	0.2	-1.71	-1.7	0.15	-0.11	0.09	0.09	-0.16	-0.39	0.09	0.05	0.63
-0.48	-1.15	-1.18	-0.5	-0.4	-1.36	-1.36	-0.43	0.4	-0.37	-0.43	0.43	-1.13	-0.26	-0.32	-0.11
-0.72	-0.95	-0.97	-0.75	-0.94	-1.11	-1.12	-0.95	-0.29	-0.3	-0.35	-0.36	-1.33	-0.47	-0.54	-0.31
-1.01	-1.05	-1.08	-1.06	-0.37	-1.37	-1.37	-0.4	0.21	-0.53	-0.62	0.21	-0.58	-0.27	-0.33	0.44
-0.17	-1.06	-1.09	-0.17	-0.62	-1.31	-1.31	-0.64	0.21	0.56	0.63	0.21	-1.54	-1.32	-1.44	-0.52
-0.58	-0.87	-0.89	-0.6	-1.86	-0.42	-0.45	-1.85	0.01	-2.01	-2.31	-0.02	-1.17	-0.2	-0.25	-0.15
-0.02	-0.77	-0.78	-0.01	0.88	-1.4	-1.4	0.82	-1.33	-0.4	-0.47	-1.55	-1.31	-0.29	-0.35	-0.29
0.2	-1.28	-1.32	0.22	-0.58	-3.11	-3.06	-0.6	0.28	0.32	0.36	0.29	0.35	0.27	0.24	1.37
0.36	-0.96	-0.98	0.39	-0.81	0.18	0.14	-0.83	0.49	0.74	0.83	0.53	0.07	0.3	0.27	1.09
-0.53	-0.06	-0.03	-0.55	-0.79	-0.33	-0.36	-0.81	0.3	0.69	0.78	0.31	-0.82	0.98	0.99	0.2
-0.27	1.5	1.62	-0.28	0.24	1.02	0.95	0.19	-0.26	1.17	1.33	-0.33	0.14	0.78	0.78	1.16
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68

-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.61	1.49	1.53	1.63
0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	0.98	0.93	0.94	2
-0.87	0.34	0.39	-0.91	-0.18	0.59	0.53	-0.21	-1.03	0.91	1.03	-1.21	0.32	0.74	0.74	1.34
0.15	0.4	0.45	0.17	0.35	-0.46	-0.49	0.3	-0.16	-0.15	-0.18	-0.21	0.42	-1.11	-1.21	1.44
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.23	-0.09	-0.12	1.38	1.08	-1.12	-1.22	2.1
0.31	0.79	0.87	0.34	0.38	-1.38	-1.38	0.33	1.05	-0.09	-0.12	1.17	0.83	-1.12	-1.22	1.85
-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.21	-0.09	-0.12	1.35	0.8	-0.8	-0.89	1.82
-1.36	-0.8	-0.82	-1.43	-0.9	-1.36	-1.36	-0.91	0.46	-1.13	-1.3	0.5	-0.1	-1.19	-1.3	0.92
-1.87	-0.98	-1	-1.97	-0.5	-0.41	-0.44	-0.53	-0.87	-0.89	-1.03	-1.03	-0.87	-1.3	-1.41	0.15
-0.48	-1.19	-1.23	-0.5	-0.56	-1.17	-1.18	-0.58	0.3	-1.08	-1.25	0.31	-1.36	-0.22	-0.27	-0.34
-1.89	-0.7	-0.71	-1.99	-2.73	-1.39	-1.39	-2.69	-1.56	-0.89	-1.03	-1.81	-0.86	-0.57	-0.64	0.16
-1.82	-0.59	-0.59	-1.92	-0.71	-1.42	-1.42	-0.73	-1.84	-0.73	-0.85	-2.13	-0.21	-1.38	-1.5	0.81
-0.32	-0.72	-0.73	-0.33	0.52	-0.04	-0.08	0.47	0.04	-0.9	-1.04	0.02	-0.41	-0.57	-0.64	0.61
-0.4	-1.42	-1.47	-0.41	-0.18	-0.8	-0.82	-0.21	0.07	-0.52	-0.61	0.05	-0.08	-0.68	-0.76	0.94
-1.01	-0.7	-0.71	-1.06	0.91	-1.88	-1.87	0.84	-1.13	-1.01	-1.17	-1.32	-0.3	-0.84	-0.93	0.72
-0.83	-0.63	-0.63	-0.87	0.3	-1.88	-1.87	0.25	-0.58	-0.86	-1	-0.69	-0.47	-0.84	-0.93	0.55
-1.14	-0.3	-0.29	-1.2	0.8	-1.16	-1.17	0.74	-0.29	-0.4	-0.47	-0.36	-0.23	-0.65	-0.73	0.79
-0.69	-0.78	-0.79	-0.72	0.71	-0.24	-0.27	0.65	-1	-1.09	-1.26	-1.17	-0.32	-0.31	-0.37	0.7
-0.85	-0.83	-0.85	-0.89	0.54	-1.37	-1.37	0.48	-1.7	-0.19	-0.23	-1.97	-0.4	-1.42	-1.54	0.62
-0.31	-0.66	-0.67	-0.32	-0.26	-0.61	-0.63	-0.29	-0.23	-0.59	-0.69	-0.29	-0.26	-1.19	-1.3	0.76
-0.93	-0.49	-0.49	-0.97	0.42	-0.52	-0.54	0.37	-0.78	-1.62	-1.86	-0.92	-0.51	-1.4	-1.52	0.51
-0.68	-0.95	-0.97	-0.71	0.41	-0.98	-0.99	0.36	0.07	-0.54	-0.63	0.05	-0.4	-0.82	-0.91	0.62
-0.49	-0.95	-0.97	-0.51	0.49	-0.58	-0.6	0.44	-0.9	-0.55	-0.64	-1.06	-0.06	-0.96	-1.06	0.96

-0.61	-0.49	-0.49	-0.64	-0.06	-0.16	-0.19	-0.1	-0.2	-1.13	-1.3	-0.26	-0.64	-1.04	-1.14	0.38
-1.28	-0.39	-0.38	-1.34	-0.09	-1.38	-1.38	-0.13	-1.51	-0.94	-1.09	-1.76	-0.69	-0.86	-0.95	0.33
-1.61	-0.97	-0.99	-1.69	0.38	-0.24	-0.27	0.33	-0.21	-1.06	-1.22	-0.27	-0.14	-1.14	-1.25	0.88
-0.75	-0.3	-0.29	-0.78	0.24	-1.16	-1.17	0.19	-0.38	-0.4	-0.47	-0.46	-0.55	-0.65	-0.73	0.47
-1.58	-0.63	-0.64	-1.66	-0.02	-1.93	-1.91	-0.06	-1.22	-0.33	-0.39	-1.43	-0.25	-1.44	-1.56	0.77
-0.98	-0.69	-0.7	-1.03	0.69	-0.76	-0.78	0.63	-0.78	-0.01	-0.02	-0.92	0	-0.96	-1.06	1.02
-1.03	-0.58	-0.58	-1.08	0.33	-0.45	-0.48	0.28	-0.37	-1.02	-1.18	-0.45	-0.14	-0.94	-1.03	0.88
-0.33	-0.09	-0.06	-0.34	0.8	-0.29	-0.32	0.74	0.19	-0.34	-0.4	0.19	-0.39	-0.75	-0.83	0.63
-0.79	-0.57	-0.57	-0.83	-0.4	-0.84	-0.86	-0.43	-0.71	-0.27	-0.32	-0.84	-0.12	-1.05	-1.15	0.9
-1.12	-0.3	-0.29	-1.17	0.41	-0.97	-0.98	0.36	-1.12	-0.13	-0.16	-1.31	-0.16	-0.65	-0.73	0.86
-0.72	-0.86	-0.88	-0.75	-0.14	-1.18	-1.19	-0.18	0.01	-1.08	-1.25	-0.02	-0.25	-1.07	-1.17	0.77
-0.66	-0.95	-0.97	-0.69	-0.14	-1.47	-1.47	-0.18	-1.37	-0.04	-0.06	-1.6	-0.26	-1.19	-1.3	0.76
-0.52	-1.35	-1.4	-0.54	0.32	-0.95	-0.96	0.27	-0.96	-1.93	-2.22	-1.13	-0.55	-0.87	-0.96	0.47
-0.49	-0.3	-0.29	-0.51	-0.6	-1.16	-1.17	-0.62	-0.68	-0.4	-0.47	-0.81	-0.55	-0.65	-0.73	0.47
-0.32	-0.29	-0.28	-0.33	0.58	-0.36	-0.39	0.52	-0.66	-0.37	-0.43	-0.79	-0.73	-1.16	-1.27	0.29
-0.25	-0.63	-0.63	-0.25	0.24	-2.65	-2.61	0.19	0.01	-0.49	-0.57	-0.02	-1.3	-1.18	-1.29	-0.28
-0.59	-0.59	-0.59	-0.61	0.13	-0.44	-0.47	0.09	-0.41	-0.58	-0.68	-0.5	-0.63	-0.91	-1	0.39
-0.99	-0.35	-0.34	-1.04	0.2	-0.29	-0.32	0.15	-1.32	-2.01	-2.31	-1.54	-0.2	-0.78	-0.87	0.82
-0.53	-0.84	-0.86	-0.55	0.22	-1.49	-1.49	0.17	-0.27	-0.03	-0.05	-0.34	-0.29	-0.67	-0.75	0.73
-0.43	-0.69	-0.7	-0.44	0.46	-0.37	-0.4	0.41	-0.35	-0.16	-0.19	-0.43	-0.48	-0.86	-0.95	0.54
-0.98	-0.33	-0.32	-1.03	0.23	-0.29	-0.32	0.18	-1.09	-1.01	-1.17	-1.28	-0.29	-0.68	-0.76	0.73
-0.36	-0.56	-0.56	-0.37	0.59	-0.79	-0.81	0.53	-0.14	-0.97	-1.12	-0.19	-0.24	-1.16	-1.27	0.78
-0.55	-0.57	-0.57	-0.57	-0.13	-1.22	-1.22	-0.17	-0.8	-0.47	-0.55	-0.95	-0.16	-1.12	-1.23	0.86
-0.96	-0.3	-0.29	-1.01	0.89	-1.16	-1.17	0.83	-0.5	-0.4	-0.47	-0.6	-0.54	-0.65	-0.73	0.48
-1.26	-0.34	-0.33	-1.32	0.58	-0.66	-0.68	0.52	-0.93	-2.01	-2.31	-1.09	-0.22	0.15	0.12	0.8

-1.33	-0.49	-0.49	-1.4	-0.49	-0.76	-0.78	-0.52	-1.56	-1	-1.15	-1.81	-0.22	-2.01	-2.17	0.8
-0.84	-0.91	-0.93	-0.88	0.18	-1.46	-1.46	0.13	-0.61	-1.11	-1.28	-0.73	-0.48	0.13	0.09	0.54
-0.5	-0.8	-0.81	-0.52	-0.35	-1.73	-1.72	-0.38	0.09	-1.14	-1.32	0.07	-0.31	-0.94	-1.03	0.71
-0.2	-0.98	-1	-0.2	0.01	-1.5	-1.5	-0.03	-0.06	-2.58	-2.96	-0.1	-0.65	-1.53	-1.66	0.37
-0.47	-0.74	-0.75	-0.49	0.53	-1.18	-1.19	0.48	-0.36	-1.48	-1.71	-0.44	-0.08	-1.07	-1.17	0.94
-0.92	-1.19	-1.23	-0.96	0.01	-1.21	-1.21	-0.03	-0.76	-0.57	-0.66	-0.9	-0.03	-0.75	-0.83	0.99
-0.4	-1.35	-1.4	-0.41	-0.48	-0.95	-0.96	-0.51	0.04	-1.93	-2.22	0.02	-0.34	-0.87	-0.96	0.68
-1.08	-0.3	-0.29	-1.13	-0.9	-0.97	-0.98	-0.91	-0.28	-0.13	-0.16	-0.35	0.05	-0.65	-0.73	1.07
-0.55	-0.3	-0.29	-0.57	-0.3	-1.28	-1.28	-0.33	0.5	-1.13	-1.31	0.54	-0.72	-0.25	-0.31	0.3
-0.56	-0.57	-0.57	-0.58	-0.25	-1.22	-1.22	-0.28	-0.12	-0.47	-0.55	-0.17	-0.2	-1.12	-1.23	0.82
0.17	-0.39	-0.38	0.19	0.27	-1.22	-1.22	0.22	0.12	-0.55	-0.64	0.11	-0.01	-1.12	-1.23	1.01
-0.08	-0.24	-0.22	-0.07	0.23	-1.16	-1.17	0.18	0.07	-0.5	-0.58	0.05	-0.26	-0.27	-0.33	0.76
-0.78	-0.28	-0.26	-0.82	0.12	-1.38	-1.38	0.08	-1.53	-0.52	-0.61	-1.78	-0.27	-0.64	-0.72	0.75
0.09	-0.41	-0.4	0.11	-0.47	-1.16	-1.17	-0.5	0.19	-0.36	-0.42	0.19	-0.5	-1.17	-1.28	0.52
-0.78	-0.62	-0.62	-0.82	0.95	-1.93	-1.91	0.88	-1.07	-2.26	-2.6	-1.25	-1.05	-0.52	-0.59	-0.03
-0.74	-1.48	-1.53	-0.77	-0.39	-1.21	-1.21	-0.42	-0.18	-0.4	-0.47	-0.24	-0.6	-0.75	-0.83	0.42
-0.69	-0.58	-0.58	-0.72	0.77	-1.18	-1.19	0.71	-0.55	-1.33	-1.53	-0.66	-0.7	-1.15	-1.26	0.32
-0.72	-0.74	-0.75	-0.75	0.9	-1.25	-1.25	0.83	-0.84	-1.48	-1.71	-0.99	0.02	-1.07	-1.17	1.04
-1.17	-0.3	-0.29	-1.23	-0.72	-1.16	-1.17	-0.74	-0.21	-0.4	-0.47	-0.27	-0.22	-0.65	-0.73	0.8
-0.99	-0.63	-0.63	-1.04	-1.05	-1.18	-1.19	-1.06	-0.66	-1.28	-1.48	-0.79	-0.42	-1.07	-1.17	0.6
-1.17	-0.75	-0.76	-1.23	-0.21	-1.45	-1.45	-0.24	0.01	0.02	0.01	-0.02	-0.34	-0.33	-0.39	0.68
-0.36	-0.34	-0.33	-0.37	0.62	-0.66	-0.68	0.56	-1.04	-0.43	-0.5	-1.22	-0.12	-0.13	-0.18	0.9
-1.17	-0.97	-0.99	-1.23	0.45	-0.3	-0.33	0.4	-2.02	-0.25	-0.3	-2.34	-0.3	-3.09	-3.3	0.72
-0.14	-0.55	-0.55	-0.14	0.3	-0.72	-0.74	0.25	-0.07	0.35	0.39	-0.11	-1.3	-1.15	-1.26	-0.28
-0.96	-0.42	-0.41	-1.01	0.07	-3.14	-3.09	0.03	-1.87	-0.25	-0.3	-2.17	-0.3	-0.6	-0.68	0.72

-0.75	-0.83	-0.85	-0.78	0.95	0.05	0.01	0.88	-0.89	-0.31	-0.37	-1.05	-0.68	-0.57	-0.64	0.34
-0.42	-0.79	-0.8	-0.43	-0.31	-0.73	-0.75	-0.34	0.47	-0.43	-0.5	0.51	0.1	-0.9	-0.99	1.12
-1.35	-1.26	-1.3	-1.42	0.05	-0.97	-0.98	0.01	-0.91	-0.07	-0.09	-1.07	-0.29	-0.67	-0.75	0.73
-1.7	-0.3	-0.29	-1.79	-0.39	-1.16	-1.17	-0.42	-0.94	-0.18	-0.22	-1.11	-0.66	-0.58	-0.65	0.36
-0.4	-0.74	-0.75	-0.41	-0.53	-1.18	-1.19	-0.56	0.17	-0.02	-0.04	0.16	-1.04	-1.19	-1.3	-0.02
-0.75	-0.89	-0.91	-0.78	0.67	-0.33	-0.36	0.61	-1.6	-0.79	-0.92	-1.86	-0.23	-1.18	-1.29	0.79
-2.09	-0.7	-0.71	-2.2	0.61	0.92	0.86	0.55	-2.18	-1.03	-1.19	-2.52	-0.13	-0.57	-0.64	0.89
-0.86	-0.77	-0.78	-0.9	0.33	0.6	0.54	0.28	-0.94	-1.17	-1.35	-1.11	-0.23	-0.95	-1.05	0.79
-1.63	-0.6	-0.6	-1.71	0.04	0.7	0.64	0	-1.39	-1.14	-1.32	-1.62	-0.15	-0.68	-0.76	0.87
-0.73	-0.46	-0.45	-0.76	0.54	-0.24	-0.27	0.48	-0.01	-1.1	-1.27	-0.04	-1.3	-0.82	-0.91	-0.28
-0.64	-0.63	-0.64	-0.67	0.74	0.55	0.5	0.68	-0.73	-0.6	-0.7	-0.87	-0.25	-1.21	-1.32	0.77
-0.43	-0.77	-0.78	-0.44	0.53	0.06	0.02	0.48	-1.35	-0.34	-0.4	-1.57	-1.06	-1.17	-1.28	-0.04
-0.98	-0.66	-0.67	-1.03	0.11	0.15	0.11	0.07	-0.83	-1	-1.15	-0.98	-0.52	-1.21	-1.32	0.5
-1.03	-0.93	-0.95	-1.08	0.73	0.14	0.1	0.67	-0.44	-0.62	-0.72	-0.53	0.07	-0.6	-0.68	1.09
-0.78	-0.84	-0.86	-0.82	-0.07	0.3	0.25	-0.11	-1.25	-0.58	-0.67	-1.46	-1.3	-0.43	-0.5	-0.28
-1.24	-0.59	-0.59	-1.3	0.51	0.46	0.41	0.46	-1.81	-0.66	-0.77	-2.1	0.03	-0.73	-0.81	1.05
-0.4	-0.97	-0.99	-0.41	0.92	0.19	0.15	0.85	-0.55	-1.37	-1.58	-0.66	-0.18	-0.44	-0.51	0.84
-0.42	-0.46	-0.45	-0.43	0.62	0.63	0.57	0.56	-0.68	-0.72	-0.84	-0.81	-0.02	-0.59	-0.66	1
-0.58	-0.94	-0.96	-0.6	0.64	0.48	0.43	0.58	-0.91	-0.76	-0.88	-1.07	-1	-1.12	-1.23	0.02
-0.43	-0.6	-0.6	-0.44	0.75	-0.27	-0.3	0.69	-0.8	-0.49	-0.57	-0.95	-1.28	-0.98	-1.08	-0.26
-0.2	-0.52	-0.52	-0.2	1	0.2	0.16	0.93	0.07	-1.76	-2.02	0.05	-0.32	-2.52	-2.7	0.7
-1.06	-0.35	-0.34	-1.11	-0.03	0.47	0.42	-0.07	-0.37	-1.04	-1.2	-0.45	-0.01	-0.66	-0.74	1.01
-1.05	-0.75	-0.76	-1.1	0.44	-0.12	-0.16	0.39	-0.83	-0.47	-0.55	-0.98	-0.2	-0.65	-0.73	0.82
-0.26	-0.5	-0.5	-0.27	0.8	0.61	0.55	0.74	0.07	-0.42	-0.49	0.05	-0.64	-1.15	-1.26	0.38
-0.4	-1.19	-1.23	-0.41	0.94	0.09	0.05	0.87	-0.75	-0.92	-1.06	-0.89	-0.17	-1.47	-1.59	0.85

-0.52	-0.51	-0.51	-0.54	0.89	0.29	0.24	0.83	-0.33	-0.46	-0.54	-0.41	-0.01	-0.55	-0.62	1.01
-0.96	-0.46	-0.46	-1.01	0.74	0.61	0.55	0.68	-1.71	-1.4	-1.61	-1.99	-0.37	-0.35	-0.41	0.65
-0.49	-1.3	-1.34	-0.51	0.45	0.39	0.34	0.4	-1	-0.48	-0.56	-1.17	-0.49	-0.45	-0.52	0.53
-0.61	-0.9	-0.92	-0.64	0.97	0.23	0.18	0.9	-0.66	-0.05	-0.07	-0.79	-0.39	-0.87	-0.96	0.63
-1.56	-1.09	-1.12	-1.64	0.46	0.64	0.58	0.41	-1.75	-1.16	-1.34	-2.03	-0.51	-0.53	-0.6	0.51
-0.57	-0.85	-0.87	-0.59	-0.21	-0.36	-0.39	-0.24	-0.69	-1.1	-1.27	-0.82	-0.3	-0.33	-0.39	0.72
-0.79	-0.6	-0.6	-0.83	0.65	-0.38	-0.41	0.59	-1	-0.77	-0.89	-1.17	-0.25	-1.17	-1.28	0.77
-1.09	-0.69	-0.7	-1.14	0.06	0.21	0.17	0.02	-1.31	-0.77	-0.89	-1.53	-0.02	-1.16	-1.27	1
-0.79	-0.64	-0.65	-0.83	0.75	0.73	0.67	0.69	-0.32	-1.08	-1.25	-0.4	-1.5	-0.54	-0.61	-0.48
-1.68	-0.95	-0.97	-1.77	0.41	0.42	0.37	0.36	-0.74	-0.12	-0.15	-0.88	-0.31	-0.01	-0.05	0.71
-0.52	-0.75	-0.76	-0.54	0.13	0.48	0.43	0.09	-0.15	-0.4	-0.47	-0.2	-0.57	-1.08	-1.18	0.45
-0.49	-0.8	-0.82	-0.51	0.03	0.52	0.47	-0.01	0	-1.1	-1.27	-0.03	-0.07	-0.79	-0.88	0.95
-0.23	-0.62	-0.62	-0.23	-0.3	0.8	0.74	-0.33	-0.52	-0.94	-1.09	-0.62	-0.05	-0.49	-0.56	0.97
-1.38	-0.29	-0.27	-1.45	0.31	0.02	-0.02	0.26	-1.73	-1.34	-1.54	-2.01	-0.01	-0.88	-0.97	1.01
-0.58	-0.5	-0.5	-0.6	0.28	0.69	0.63	0.23	-0.28	-0.93	-1.08	-0.35	-0.66	-0.03	-0.07	0.36
-0.59	-0.7	-0.71	-0.61	0.18	0.59	0.53	0.13	0.16	-1.27	-1.46	0.15	-0.86	-0.66	-0.74	0.16
-1.23	-0.8	-0.82	-1.29	0.15	0.77	0.71	0.11	-0.73	-0.84	-0.97	-0.87	-0.14	-0.16	-0.21	0.88
-1.28	-1.12	-1.15	-1.34	0.39	1.18	1.11	0.34	-2.18	-1.07	-1.23	-2.52	-0.35	-0.48	-0.55	0.67
-0.41	-0.67	-0.68	-0.42	-0.2	0.21	0.17	-0.23	0.01	-1.11	-1.28	-0.02	-0.42	-0.57	-0.64	0.6
-0.14	-0.06	-0.03	-0.14	-0.63	0.52	0.47	-0.65	0.73	-0.52	-0.61	0.81	0.81	-1.02	-1.12	1.83
0.07	0.16	0.2	0.08	-0.07	0.27	0.22	-0.11	-0.51	-2.18	-2.5	-0.61	-0.69	-1.12	-1.22	0.33
-0.72	0.08	0.12	-0.75	0.31	1.16	1.09	0.26	-0.37	0.52	0.58	-0.45	1.12	0.47	0.45	2.14
0.06	0.35	0.4	0.07	0.76	-1.19	-1.2	0.7	-0.7	0.69	0.78	-0.83	1.28	0.9	0.91	2.3
0.58	0.31	0.36	0.62	-0.1	0.78	0.72	-0.14	0.8	0.69	0.78	0.89	0.32	0.52	0.51	1.34
1.11	-0.44	-0.43	1.18	0.73	1.15	1.08	0.67	0.72	0.68	0.77	0.79	0.57	0.48	0.46	1.59

-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.61	0.73	0.8	0.66	0.92	0.45	0.4	0.85	0.25	0.49	0.55	0.26	-1.55	0.36	0.34	-0.53
-0.63	-1.07	-1.1	-0.66	0.32	-1.76	-1.75	0.27	0.1	-0.51	-0.59	0.08	-1.32	-0.2	-0.25	-0.3
-0.74	-0.32	-0.31	-0.77	-0.44	-2.55	-2.52	-0.47	0.54	0.18	0.2	0.59	-1.51	0.07	0.03	-0.49
-0.53	-1.11	-1.14	-0.55	0.2	-1.71	-1.7	0.15	-0.11	0.09	0.09	-0.16	-0.39	0.09	0.05	0.63
-0.48	-1.15	-1.18	-0.5	-0.4	-1.36	-1.36	-0.43	0.4	-0.37	-0.43	0.43	-1.13	-0.26	-0.32	-0.11
-0.72	-0.95	-0.97	-0.75	-0.94	-1.11	-1.12	-0.95	-0.29	-0.3	-0.35	-0.36	-1.33	-0.47	-0.54	-0.31
-1.01	-1.05	-1.08	-1.06	-0.37	-1.37	-1.37	-0.4	0.21	-0.53	-0.62	0.21	-0.58	-0.27	-0.33	0.44
-0.17	-1.06	-1.09	-0.17	-0.62	-1.31	-1.31	-0.64	0.21	0.56	0.63	0.21	-1.54	-1.32	-1.44	-0.52
-0.58	-0.87	-0.89	-0.6	-1.86	-0.42	-0.45	-1.85	0.01	-2.01	-2.31	-0.02	-1.17	-0.2	-0.25	-0.15
-0.02	-0.77	-0.78	-0.01	0.88	-1.4	-1.4	0.82	-1.33	-0.4	-0.47	-1.55	-1.31	-0.29	-0.35	-0.29
0.2	-1.28	-1.32	0.22	-0.58	-3.11	-3.06	-0.6	0.28	0.32	0.36	0.29	0.35	0.27	0.24	1.37
0.36	-0.96	-0.98	0.39	-0.81	0.18	0.14	-0.83	0.49	0.74	0.83	0.53	0.07	0.3	0.27	1.09
-0.53	-0.06	-0.03	-0.55	-0.79	-0.33	-0.36	-0.81	0.3	0.69	0.78	0.31	-0.82	0.98	0.99	0.2
-0.27	1.5	1.62	-0.28	0.24	1.02	0.95	0.19	-0.26	1.17	1.33	-0.33	0.14	0.78	0.78	1.16
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-0.14	-0.06	-0.03	-0.14	-0.63	0.52	0.47	-0.65	0.73	-0.52	-0.61	0.81	0.81	-1.02	-1.12	1.83
0.07	0.16	0.2	0.08	-0.07	0.27	0.22	-0.11	-0.51	-2.18	-2.5	-0.61	-0.69	-1.12	-1.22	0.33
-0.72	0.08	0.12	-0.75	0.31	1.16	1.09	0.26	-0.37	0.52	0.58	-0.45	1.12	0.47	0.45	2.14

0.06	0.35	0.4	0.07	0.76	-1.19	-1.2	0.7	-0.7	0.69	0.78	-0.83	1.28	0.9	0.91	2.3
0.58	0.31	0.36	0.62	-0.1	0.78	0.72	-0.14	0.8	0.69	0.78	0.89	0.32	0.52	0.51	1.34
1.11	-0.44	-0.43	1.18	0.73	1.15	1.08	0.67	0.72	0.68	0.77	0.79	0.57	0.48	0.46	1.59
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.61	0.73	0.8	0.66	0.92	0.45	0.4	0.85	0.25	0.49	0.55	0.26	-1.55	0.36	0.34	-0.53
-0.63	-1.07	-1.1	-0.66	0.32	-1.76	-1.75	0.27	0.1	-0.51	-0.59	0.08	-1.32	-0.2	-0.25	-0.3
-0.74	-0.32	-0.31	-0.77	-0.44	-2.55	-2.52	-0.47	0.54	0.18	0.2	0.59	-1.51	0.07	0.03	-0.49
-0.53	-1.11	-1.14	-0.55	0.2	-1.71	-1.7	0.15	-0.11	0.09	0.09	-0.16	-0.39	0.09	0.05	0.63
-0.48	-1.15	-1.18	-0.5	-0.4	-1.36	-1.36	-0.43	0.4	-0.37	-0.43	0.43	-1.13	-0.26	-0.32	-0.11
-0.72	-0.95	-0.97	-0.75	-0.94	-1.11	-1.12	-0.95	-0.29	-0.3	-0.35	-0.36	-1.33	-0.47	-0.54	-0.31
-1.01	-1.05	-1.08	-1.06	-0.37	-1.37	-1.37	-0.4	0.21	-0.53	-0.62	0.21	-0.58	-0.27	-0.33	0.44
-0.17	-1.06	-1.09	-0.17	-0.62	-1.31	-1.31	-0.64	0.21	0.56	0.63	0.21	-1.54	-1.32	-1.44	-0.52
-0.58	-0.87	-0.89	-0.6	-1.86	-0.42	-0.45	-1.85	0.01	-2.01	-2.31	-0.02	-1.17	-0.2	-0.25	-0.15
-0.02	-0.77	-0.78	-0.01	0.88	-1.4	-1.4	0.82	-1.33	-0.4	-0.47	-1.55	-1.31	-0.29	-0.35	-0.29
0.2	-1.28	-1.32	0.22	-0.58	-3.11	-3.06	-0.6	0.28	0.32	0.36	0.29	0.35	0.27	0.24	1.37
0.36	-0.96	-0.98	0.39	-0.81	0.18	0.14	-0.83	0.49	0.74	0.83	0.53	0.07	0.3	0.27	1.09
-0.53	-0.06	-0.03	-0.55	-0.79	-0.33	-0.36	-0.81	0.3	0.69	0.78	0.31	-0.82	0.98	0.99	0.2
-0.27	1.5	1.62	-0.28	0.24	1.02	0.95	0.19	-0.26	1.17	1.33	-0.33	0.14	0.78	0.78	1.16
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68

-0.14	-0.06	-0.03	-0.14	-0.63	0.52	0.47	-0.65	0.73	-0.52	-0.61	0.81	0.81	-1.02	-1.12	1.83
0.07	0.16	0.2	0.08	-0.07	0.27	0.22	-0.11	-0.51	-2.18	-2.5	-0.61	-0.69	-1.12	-1.22	0.33
-0.72	0.08	0.12	-0.75	0.31	1.16	1.09	0.26	-0.37	0.52	0.58	-0.45	1.12	0.47	0.45	2.14
0.06	0.35	0.4	0.07	0.76	-1.19	-1.2	0.7	-0.7	0.69	0.78	-0.83	1.28	0.9	0.91	2.3
0.58	0.31	0.36	0.62	-0.1	0.78	0.72	-0.14	0.8	0.69	0.78	0.89	0.32	0.52	0.51	1.34
1.11	-0.44	-0.43	1.18	0.73	1.15	1.08	0.67	0.72	0.68	0.77	0.79	0.57	0.48	0.46	1.59
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.61	1.49	1.53	1.63
0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	0.98	0.93	0.94	2
0.61	0.73	0.8	0.66	0.92	0.45	0.4	0.85	0.25	0.49	0.55	0.26	-1.55	0.36	0.34	-0.53
-0.63	-1.07	-1.1	-0.66	0.32	-1.76	-1.75	0.27	0.1	-0.51	-0.59	0.08	-1.32	-0.2	-0.25	-0.3
-0.74	-0.32	-0.31	-0.77	-0.44	-2.55	-2.52	-0.47	0.54	0.18	0.2	0.59	0	0.07	0.03	1.02
-0.53	-1.11	-1.14	-0.55	0.2	-1.71	-1.7	0.15	-0.11	0.09	0.09	-0.16	-0.39	0.09	0.05	0.63
-0.48	-1.15	-1.18	-0.5	-0.4	-1.36	-1.36	-0.43	0.4	-0.37	-0.43	0.43	-1.13	-0.26	-0.32	-0.11
-0.72	-0.95	-0.97	-0.75	-0.94	-1.11	-1.12	-0.95	-0.29	-0.3	-0.35	-0.36	-1.33	-0.47	-0.54	-0.31
-1.01	-1.05	-1.08	-1.06	-0.37	-1.37	-1.37	-0.4	0.21	-0.53	-0.62	0.21	-0.58	-0.27	-0.33	0.44
-0.17	-1.06	-1.09	-0.17	-0.62	-1.31	-1.31	-0.64	0.21	0.56	0.63	0.21	-1.54	-1.32	-1.44	-0.52
-0.58	-0.87	-0.89	-0.6	-1.86	-0.42	-0.45	-1.85	0.01	-2.01	-2.31	-0.02	-1.17	-0.2	-0.25	-0.15
-0.02	-0.77	-0.78	-0.01	0.88	-1.4	-1.4	0.82	-1.33	-0.4	-0.47	-1.55	-1.31	-0.29	-0.35	-0.29
0.2	-1.28	-1.32	0.22	-0.58	-3.11	-3.06	-0.6	0.28	0.32	0.36	0.29	0.35	0.27	0.24	1.37

0.36	-0.96	-0.98	0.39	-0.81	0.18	0.14	-0.83	0.49	0.74	0.83	0.53	0.07	0.3	0.27	1.09
-0.53	-0.06	-0.03	-0.55	-0.79	-0.33	-0.36	-0.81	0.3	0.69	0.78	0.31	-0.82	0.98	0.99	0.2
-0.27	1.5	1.62	-0.28	0.24	1.02	0.95	0.19	-0.26	1.17	1.33	-0.33	0.14	0.78	0.78	1.16
-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
-2.48	-0.65	-0.66	-2.61	0.25	0.94	0.87	0.2	-2.08	-1.08	-1.25	-2.41	-0.42	-1.14	-1.25	0.6
-1.47	-0.99	-1.02	-1.55	0.23	1.12	1.05	0.18	-1.23	-0.84	-0.97	-1.44	-0.39	-0.01	-0.05	0.63
-0.09	-0.64	-0.65	-0.09	0.18	0.42	0.37	0.13	0.33	-0.3	-0.36	0.35	-0.09	-1.14	-1.25	0.93
-0.71	-0.8	-0.81	-0.74	0.56	1.03	0.96	0.5	-0.47	-1.07	-1.24	-0.57	-0.24	-1.19	-1.3	0.78
-0.53	-0.7	-0.71	-0.55	-0.68	0.1	0.06	-0.7	0.01	-0.79	-0.92	-0.02	-0.17	-1.29	-1.4	0.85
-0.1	-0.57	-0.57	-0.1	-0.04	-0.07	-0.11	-0.08	0.3	-1.15	-1.33	0.31	-0.41	-0.71	-0.79	0.61
-0.21	-0.68	-0.69	-0.21	0.25	0.03	-0.01	0.2	0.31	-0.6	-0.7	0.32	0.03	-1.93	-2.08	1.05
-0.62	-0.69	-0.7	-0.65	0.46	0.45	0.4	0.41	0.1	-0.65	-0.75	0.08	-0.15	-0.73	-0.81	0.87
-1.37	-0.87	-0.89	-1.44	0.22	0.32	0.27	0.17	-1.67	-1	-1.16	-1.94	-0.21	-0.63	-0.71	0.81
-0.51	-0.47	-0.47	-0.53	-0.55	0.1	0.06	-0.57	0.16	-0.88	-1.02	0.15	-0.42	-0.72	-0.8	0.6
-0.39	-0.51	-0.51	-0.4	0.46	0.74	0.68	0.41	-0.95	-0.43	-0.5	-1.12	-0.03	-0.67	-0.75	0.99
-0.44	-0.56	-0.56	-0.46	0.15	0.61	0.55	0.11	-0.24	-0.98	-1.13	-0.3	-1.12	-1.14	-1.25	-0.1
-0.54	-0.8	-0.82	-0.56	0.57	0.89	0.83	0.51	-0.7	-0.99	-1.14	-0.83	-0.42	-0.01	-0.05	0.6
-0.68	-1.22	-1.26	-0.71	-0.27	-1.25	-1.25	-0.3	-0.82	-0.5	-0.58	-0.97	0.04	-1.14	-1.25	1.06
-1.2	-1.13	-1.16	-1.26	-0.46	0.62	0.56	-0.49	-0.24	-1.48	-1.7	-0.3	-0.13	-1.19	-1.3	0.89
0.09	-1.25	-1.29	0.11	0.22	0.72	0.66	0.17	0.34	-1.14	-1.32	0.36	-0.15	-1.29	-1.4	0.87
-0.6	-0.55	-0.55	-0.62	0.74	0.59	0.53	0.68	-0.59	-1.13	-1.3	-0.7	-0.32	-0.71	-0.79	0.7

-0.29	-0.8	-0.81	-0.3	-0.57	0.65	0.59	-0.59	0.54	-0.19	-0.23	0.59	-0.38	-1.93	-2.08	0.64
-0.66	-1.15	-1.18	-0.69	0.36	0.42	0.37	0.31	-0.16	-0.23	-0.27	-0.21	-0.49	-0.73	-0.81	0.53
-0.38	-0.7	-0.71	-0.39	0	0.51	0.46	-0.04	-0.09	-1.2	-1.38	-0.13	-0.04	-0.63	-0.71	0.98
-1.43	-0.65	-0.66	-1.5	-0.24	1.03	0.96	-0.27	-0.21	-1.13	-1.31	-0.27	-0.12	-0.72	-0.8	0.9
-0.5	-0.67	-0.68	-0.52	0.45	0.68	0.62	0.4	-0.52	-2.05	-2.36	-0.62	-0.08	-0.67	-0.75	0.94
-1.46	-0.56	-0.56	-1.53	-0.66	0.47	0.42	-0.68	-1.23	-1.13	-1.3	-1.44	-0.01	-1.14	-1.25	1.01
-1.15	-1.18	-1.22	-1.21	-0.15	1.05	0.98	-0.19	-1.32	-1.25	-1.44	-1.54	-0.65	-0.01	-0.05	0.37
-0.86	-0.77	-0.78	-0.9	-0.26	1.02	0.95	-0.29	0.17	-1.06	-1.22	0.16	0.1	-1.14	-1.25	1.12
-0.69	-0.78	-0.79	-0.72	0.22	0.32	0.27	0.17	-0.47	-1.71	-1.97	-0.57	-0.31	-1.19	-1.3	0.71
-0.16	-0.97	-0.99	-0.16	0.28	1.09	1.02	0.23	0.14	-1.18	-1.36	0.13	-0.06	-1.29	-1.4	0.96
-0.41	-0.71	-0.72	-0.42	0.46	1.21	1.14	0.41	0.24	-1	-1.16	0.24	-0.62	-0.71	-0.79	0.4
-0.38	-1.01	-1.04	-0.39	0.74	1.21	1.14	0.68	-0.25	-1	-1.16	-0.32	-0.25	-1.93	-2.08	0.77
-0.74	-0.81	-0.83	-0.77	0.22	0.26	0.21	0.17	-0.81	-1.58	-1.82	-0.96	-0.24	-0.73	-0.81	0.78
-0.53	-0.58	-0.58	-0.55	-0.22	0.84	0.78	-0.25	-0.1	-1.28	-1.48	-0.14	-0.27	-0.63	-0.71	0.75
-0.37	-0.79	-0.8	-0.38	0.37	0.42	0.37	0.32	0	-1.27	-1.46	-0.03	-0.51	-0.72	-0.8	0.51
-0.95	-0.8	-0.82	-1	0.13	0.82	0.76	0.09	-0.53	-1.05	-1.21	-0.64	0.03	-0.67	-0.75	1.05
-0.6	-0.73	-0.74	-0.62	0.12	1.1	1.03	0.08	-0.24	-1	-1.16	-0.3	-0.36	-1.14	-1.25	0.66
-1.36	-0.79	-0.8	-1.43	0.32	0.45	0.4	0.27	-1.53	-0.71	-0.82	-1.78	-0.17	-0.01	-0.05	0.85
-0.35	-0.74	-0.75	-0.36	-0.15	0.65	0.59	-0.19	-0.7	-1.41	-1.62	-0.83	-0.21	-1.14	-1.25	0.81
-0.46	-0.6	-0.6	-0.48	0.18	0.59	0.53	0.13	-0.4	-0.56	-0.65	-0.49	-0.09	-1.19	-1.3	0.93
-0.18	-0.71	-0.72	-0.18	0.31	0.7	0.64	0.26	-0.21	-1	-1.15	-0.27	-0.14	-1.29	-1.4	0.88
-0.14	-0.06	-0.03	-0.14	-0.63	0.52	0.47	-0.65	0.73	-0.52	-0.61	0.81	0.81	-0.71	-0.79	1.83
0.07	0.16	0.2	0.08	-0.07	0.27	0.22	-0.11	-0.51	-2.18	-2.5	-0.61	-0.69	-1.93	-2.08	0.33
-0.72	0.08	0.12	-0.75	0.31	1.16	1.09	0.26	-0.37	0.52	0.58	-0.45	1.12	-0.73	-0.81	2.14
0.06	0.35	0.4	0.07	0.76	-1.19	-1.2	0.7	-0.7	0.69	0.78	-0.83	1.28	-0.63	-0.71	2.3

	0.58	0.31	0.36	0.62	-0.1	0.78	0.72	-0.14	0.8	0.69	0.78	0.89	0.32	-0.72	-0.8	1.34
	1.11	-0.44	-0.43	1.18	0.73	1.15	1.08	0.67	0.72	0.68	0.77	0.79	0.57	-0.67	-0.75	1.59
	-0.01	0.05	0.08	0	0.5	1.2	1.13	0.45	1.14	0.48	0.54	1.27	1.05	-1.17	-1.28	2.07
	0.85	0.27	0.32	0.91	1.05	1.02	0.95	0.98	0.31	0.97	1.1	0.32	1.4	1.16	1.18	2.42
	-0.71	0.72	0.79	-0.74	0.3	0.51	0.46	0.25	0.87	1.24	1.41	0.97	0.61	0.29	0.26	1.63
	0.69	1.39	1.5	0.74	1.2	0.6	0.54	1.13	0.69	0.7	0.79	0.76	0.66	0.58	0.57	1.68
	-0.8	-0.06	-0.03	-0.84	-0.18	0.87	0.81	-0.21	0.89	0.9	1.02	0.99	0.66	0.67	0.66	1.68
	-0.44	1.35	1.46	-0.46	0.65	0.31	0.26	0.59	0.63	0.84	0.95	0.69	0.61	1.49	1.53	1.63
	0.98	1.37	1.48	1.05	0.23	1.55	1.47	0.18	0.49	-1.08	-1.25	0.53	1.11	0.31	0.28	2.13
	-0.89	0.52	0.58	-0.93	0.67	-0.27	-0.3	0.61	1.3	0.47	0.53	1.46	0.98	0.93	0.94	2
	-0.87	0.34	0.39	-0.91	-0.18	0.59	0.53	-0.21	-1.03	0.91	1.03	-1.21	0.32	0.74	0.74	1.34
	0.15	0.4	0.45	0.17	0.35	-0.46	-0.49	0.3	-0.16	-0.15	-0.18	-0.21	0.42	-1.11	-1.21	1.44
	-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.23	-0.09	-0.12	1.38	1.08	-1.12	-1.22	2.1
	0.31	0.79	0.87	0.34	0.38	-1.38	-1.38	0.33	1.05	-0.09	-0.12	1.17	0.83	-1.12	-1.22	1.85
	-0.48	0.85	0.93	-0.5	0.39	-1.65	-1.64	0.34	1.21	-0.09	-0.12	1.35	0.8	-0.8	-0.89	1.82
	-1.36	-0.8	-0.82	-1.43	-0.9	-1.36	-1.36	-0.91	0.46	-1.13	-1.3	0.5	-0.1	-1.19	-1.3	0.92
	-1.87	-0.98	-1	-1.97	-0.5	-0.41	-0.44	-0.53	-0.87	-0.89	-1.03	-1.03	-0.87	-1.3	-1.41	0.15
	-0.48	-1.19	-1.23	-0.5	-0.56	-1.17	-1.18	-0.58	0.3	-1.08	-1.25	0.31	-1.36	-0.22	-0.27	-0.34
	-1.89	-0.7	-0.71	-1.99	-2.73	-1.39	-1.39	-2.69	-1.56	-0.89	-1.03	-1.81	-0.86	-0.57	-0.64	0.16
1040	-1.82	-0.59	-0.59	-1.92	-0.71	-1.42	-1.42	-0.73	-1.84	-0.73	-0.85	-2.13	-0.21	-1.38	-1.5	0.81
1041	-0.55	-0.71	-0.72	-0.57	-0.43	0.3	0.25	-0.46	-0.87	-0.09	-0.12	-1.03	-0.7	-1.14	-1.25	0.32
1042	-1.05	-0.65	-0.66	-1.1	0.29	0.81	0.75	0.24	-1.82	-1.09	-1.26	-2.11	-0.13	-0.01	-0.05	0.89
1043	-1.32	-0.91	-0.93	-1.39	-0.5	0.6	0.54	-0.53	-0.75	-0.16	-0.19	-0.89	-0.54	-1.14	-1.25	0.48
1044	-0.3	-0.49	-0.49	-0.31	0.19	-0.15	-0.18	0.14	-0.15	-1.14	-1.32	-0.2	-0.02	-1.19	-1.3	1
1045	-0.85	-0.83	-0.85	-0.89	-0.1	0.76	0.7	-0.14	-0.42	-1.01	-1.17	-0.51	0.15	-1.29	-1.4	1.17

1046	-0.36	-1.16	-1.2	-0.37	0.24	1.39	1.31	0.19	-0.54	-0.88	-1.02	-0.65	-0.34	-0.71	-0.79	0.68
1047	-0.27	-0.12	-0.1	-0.28	-0.23	0.3	0.25	-0.26	-0.32	-1.09	-1.26	-0.4	-0.16	-1.93	-2.08	0.86
1048	-0.82	-0.29	-0.27	-0.86	-0.74	0.44	0.39	-0.76	0.27	-1.11	-1.28	0.28	-0.36	-0.73	-0.81	0.66
1049	-0.46	-0.78	-0.79	-0.48	-0.41	0.06	0.02	-0.44	-0.2	-2.15	-2.47	-0.26	-1.18	-0.63	-0.71	-0.16
1050	-0.94	-0.96	-0.98	-0.98	-0.42	0.86	0.8	-0.45	0.15	-1.37	-1.58	0.14	-0.16	-0.72	-0.8	0.86
1051	-0.8	-0.57	-0.57	-0.84	0.78	0.34	0.29	0.72	-1.61	-1.78	-2.05	-1.87	-0.56	-0.67	-0.75	0.46

Appendix 10

Computation of transformation equations

For year 2011

μ_N = -0.01,μ_W = 0.02, σ_N = 1.065,σ_W = 1.127

On substitution of these values into equation 4.1, we have

$$x_N = \frac{1.065}{1.127}x_W + (-0.01 - \frac{1.065}{1.127}0.02)$$

$x_N = (Tr\ x_N)$ = 0.945$x_W - 0.03$ -------------eqn 4.3

And on substitution of the means and standard deviationsof examinees ability scores on NECO and WAEC tests into eqn 4.2 we have

$x_W = \frac{1.127}{1.065}x_N + \left(0.02 - \frac{1.127}{1.065}\ (-0.01)\right)$

x_W =$(Tr\ x_W)$ = 1.058x_N + 0.01 --------------eqn 4.4

For year 2012

μ_N = 0.03, μ_W = -0.01, σ_N = 1.103, σ_W = 1.012

On substitution of these values into equation 4.1 we have

$x_N = \frac{1.103}{1.072}x_W + [0.03 - \frac{1.103}{1.072}(-0.01)]$

x_N = $(Tr\ x_N)$ = 1.029x_W + 0.04 --------eqn 4.5

And on substitution of the values into eqn 4.2 we have,

$x_W = \frac{1.072}{1.103}x_N + \left(-0.01 - \frac{1.072}{1.103}0.03\right)$

x_W =($Tr\ x_W$) = 0.972x_N – 0.04 ------------eqn 4.6

For year 2013

μ_N = 0.02, μ_W = -0.01, σ_N = 0.973, σ_W = 1.113, on substitution of these values into eqn 4.1 we have,

$$x_N = \frac{0.973}{1.113} x_W + [0.02 - \frac{0.973}{1.113}(-0.01)]$$

x_N =($Tr\ x_N$) = 0.874x_W + 0.01 ------------- eqn 4.7

And substitution of the means and standard deviations of examinees ability scores on NECO and WAEC mathematics tests into eqn 4.2 we have;

$x_W = \frac{1.113}{0.973} x_N + \left(-0.01 - \frac{1.113}{0.973} 0.02\right)$

x_W =($Tr\ x_W$)= 1.144$x_N - 0.03$ ---------- eqn 4.8, and

for year 2014

μ_N = 0.05, μ_W = 0.01, σ_N = 0.988, σ_W = 1.043, on substitution of these values into eqn 4.1 we have;

$$x_N = \frac{0.988}{1.043} x_W + (0.05 - \frac{0.988}{1.043} 0.01)$$

x_N =($Tr\ x_N$) = 0.947x_W + 0.04 ----------- eqn 4.9

And on substitution of the means and standard deviations of examinees ability scores on NECO and WAEC mathematics tests into eqn 4.2 we have;

$x_W = \frac{1.043}{0.988} x_N + \left(0.01 - \frac{1.043}{0.988} 0.05\right)$

x_W=($Tr\ x_W$) = 1.056$x_N - 0.04$ ---------- eqn4.10

Where; ($Tr\ x_N$) is the ability score of an examinee on NECO mathematics test transformed to the scale of WAEC Mathematics test, and ($Tr\ x_W$) is the ability score of an examinee on WAEC Mathematics test transformed to the scale of NECO Mathematics test

Equations 4.3, 4.5, 4.7, and 4.9 represent the functions used for placing ability scores of examinees on NECO mathematics test of 2011, 2012, 2013, and 2014 unto the scale of the examinees ability scores on WAEC mathematics test of 2011, 2012, 2013, and 2014 respectively. While equations 4.4, 4.6, 4.8, and 4.10 represent the functions used for placing ability scores of examinees on WAEC Mathematics test of years 2011, 2012, 2013, and 2014 unto the scale of the ability scores of examinees on NECO Mathematics test of 2011, 2012, 2013, and 2104 respectively.