Tutorial letter 101/0/2017

Access to Mathematics
MAT0511

Year module

Department of Mathematical Sciences

IMPORTANT INFORMATION:
This tutorial letter contains important information about your module.
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1 INTRODUCTION

Dear Student

Welcome to the MAT0511 module in the Department of Mathematical Sciences at Unisa. We trust
that you will find this module both interesting and rewarding.

Some of this tutorial matter may not be available when you register. Tutorial matter that is not
available when you register will be posted to you as soon as possible, but is also available on
myUnisa.

1.1 myUnisa

You must be registered on myUnisa (http://my.unisa.ac.za) to be able to submit assignments on-
line, gain access to the library functions and various learning resources, download study material,
“chat” to your lecturers and fellow students about your studies and the challenges encounter, and
participate in online discussion forums. myUnisa provides additional opportunities to take part in
activities and discussions of relevance to your module topics, assignments, marks and examina-
tions.

1.2 Tutorial matter

A tutorial letter is our way of communicating with you about teaching, learning and assessment.
You will receive a number of tutorial letters during the course of the module. This particular tutorial
letter contains important information about the scheme of work, resources and assignments for this
module as well as the admission requirements for the examinations. We urge you to read this and
subsequent tutorial letters carefully and to keep it at hand when working through the study material,
preparing and submitting the assignments, preparing for the examination and addressing queries
that you may have about the course (course content, textbook, worked examples and exercises,
theorems and their applications in your assignments, tutorial and textbook problems, etc.) to your
MAT0511 lecturers.

2 PURPOSE AND OUTCOMES OF THE MODULE

2.1 Purpose

This module will be useful to students who have studied Mathematics at matriculation level but who
do not satisfy the minimum requirements for direct admission to tertiary-level study.

2.1.1 Range statement for the module

The skills developed in this module are extended to the National Senior Certificate level 4. As far
as possible the problems selected are applied in real contexts.
2.2 Outcomes

Specific outcome 1:
Do operations on Real Numbers and use Basic Algebra Tools
Assessment criteria

1.1 Recognition and use of the different kinds of numbers, number sets and set notations.
1.2 Operate on real numbers and obeying the rules.
1.3 Solve problems which involve ratio, proportion and percentage.
1.4 Apply the definitions of integral exponents, scientific notation and roots.
1.5 Convert units and derived units in the metric system to other units in the metric system or non-metric units to metric units and vice versa.

Specific outcome 2:
Perform basic Algebraic operations by using Algebra tools
Assessment criteria

2.1 Perform basic Algebraic operations like adding, subtracting, multiplying and dividing of algebraic expressions correctly, including working with Algebraic Fractions.
2.2 Solve Linear and Quadratic Equations and Inequalities, Equations containing Roots, and Systems of Equations in Two Unknowns, correctly.
2.3 Identify Arithmetic and Geometric Sequences and find specific terms of these sequences.
2.4 Solve Equations containing Exponents and Exponential Equations correctly, by applying the Definitions and Exponential Rules.
2.5 Solve Logarithmic Equations by applying the various properties of logarithms correctly.
2.6 Solve problems by applying the Compound Interest formulas, Appreciation and Depreciation formulas, Population Growth formula and Radio Active Decay and Half-Life Formulas correctly.

Specific outcome 3:
Plot Graphs and Interpret and Apply information on Given Graphs
Assessment criteria

3.1 Draw a graph by plotting points or by using a given equation.
3.2 Apply Analytical Geometry formulas to find the coordinates of a point, distances between points, midpoints, and equations of circles.
3.3 Interpret information on a given graph to find the solutions of equations or inequalities.
3.4 Find the $x$– and $y$–intercepts if the equation of a graph is given; determine whether or not a point lies on a given graph; find the $x$ values for which $y < 0$, $y = 0$ or $y > 0$. 
3.5 Identify the correspondence in a relation, whether the relation is a function, and the domain and range of a given relation.

3.6 Recognise whether or when two functions are equal.

3.7 Use functional notation correctly and determine function values by substitution of given domain values.

3.8 Obtain new functions from existing functions by addition, subtraction, multiplication and division and the domains of these new functions.

3.9 Draw a straight line graph by using a table of values, two points or the point – slope method. Also draw vertical, horizontal, parallel and perpendicular lines.

3.10 Find the slope-intercept, point-slope, two-point or general equation of a line.

3.11 Find the intersection of two lines; or the vertical distance between two lines.

3.12 Apply knowledge of linear functions to problems involving linear cost- and income functions.

3.13 Sketch the graph of a linear inequality and the graph of the solution of a system of linear inequalities.

3.14 Recognise equations which show direct, indirect or joint proportionality amongst different variables.

3.15 Recognise the characteristics, sketch the graph, find the maxima or minima and find the equation (if three points on the parabola, or the vertex and another point on the parabola or the \( x \)-intercepts and another point on the parabola are given) of a parabola defined by

\[
y = ax^2 + bx + c \quad \text{and} \quad y = a(x - h)^2 + k.
\]

3.16 Use a rough sketch of a parabola to solve a quadratic inequality or rational inequality.

3.17 Recognise the characteristics of a hyperbola; sketch the graph of a hyperbola and find the equation of a hyperbola if a point on the hyperbola or the closest distance from the origin to the hyperbola is given.

3.18 Interpret various combinations of graphs.

**Specific outcome 4:**
Use Statistics to determine valuable information from collected data.
3 LECTURER(S) AND CONTACT DETAILS

3.1 Lecturer(s)

The contact details of the lecturer responsible for this module is:

<table>
<thead>
<tr>
<th>The MAT0511 Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Mathematical Sciences</td>
</tr>
<tr>
<td>Private Bag X6</td>
</tr>
<tr>
<td>Florida</td>
</tr>
<tr>
<td>1709</td>
</tr>
<tr>
<td>South Africa</td>
</tr>
</tbody>
</table>

Additional contact details for the module lecturers will be provided in a subsequent tutorial letter.

All queries that are not of a purely administrative nature but are about the content of this module should be directed to your lecturer(s). Please have your study material with you when you contact your lecturer by phone. If you are unable to reach us, leave a message with the departmental secretary. Provide your name, the time of the telephone call and contact details. If you have problems with questions that you are unable to solve, please send your own attempts so that the lecturers can determine where the fault lies. When you speak to a lecturer, it is helpful to be very specific about your problem. For example, rather than saying

**"I don’t understand fractions."**

It is much easier for us to help you if you say something like

**"On page 136 of Book 2 there is a step in the example that I don’t understand. In the third line the example gives \( \frac{2}{3} \div \frac{1}{2} = \frac{4}{3} \). Please can you tell me how to get this answer?"**

It may help you to explain your problem more clearly over the telephone if you first write it down yourself. Make sure you have paper and a pen available when you phone, so that you can write down the explanation.

**Please note:** Letters to lecturers may not be enclosed with or inserted into assignments.

3.2 Department

The contact details for the Department of Mathematical Sciences are:

Departmental Secretary: (011) 670 9147 (SA) +27 11 670 9147 (International).

3.3 University

If you need to contact the University about matters not related to the content of this module, please consult the publication *Studies @ Unisa* that you received with your study material. This booklet contains information on how to contact the University (e.g. to whom you can write for different queries, important telephone and fax numbers, addresses and details of the times certain facilities are open). Always have your student number at hand when you contact the University.
4 RESOURCES

4.1 Prescribed books
There is NO TEXTBOOK prescribed for this module.

4.2 Recommended books
There are NO recommended books for this module.

4.3 Electronic Reserves (e-Reserves)
There are NO e-Reserves for this module.

4.4 Library services and resources information
For brief information go to:
http://www.unisa.ac.za/brochures/studies
For more detailed information, go to the Unisa website: http://www.unisa.ac.za/, click on Library.
For research support and services of Personal Librarians, go to:
http://www.unisa.ac.za/Default.asp?Cmd=ViewContent&ID=7102
The Library has compiled numerous library guides:

- find recommended reading in the print collection and e-reserves
  - http://libguides.unisa.ac.za/request/undergrad

- request material
  - http://libguides.unisa.ac.za/request/request

- postgraduate information services
  - http://libguides.unisa.ac.za/request/postgrad

- finding, obtaining and using library resources and tools to assist in doing research
  - http://libguides.unisa.ac.za/Research_Skills

- how to contact the Library/find us on social media/frequently asked questions
  - http://libguides.unisa.ac.za/ask

5 STUDENT SUPPORT SERVICES

For information on the various student support services available at Unisa (e.g student counselling, tutorial classes, language support), please consult the publication Studies @ Unisa that you received with your study material.
5.1 Contact with fellow students

5.1.1 Study groups

It is advisable to have contact with fellow students. One way to do this is to form study groups. The addresses of students in your area may be obtained from the following department:

<table>
<thead>
<tr>
<th>Directorate: Student Administration and Registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO Box 392</td>
</tr>
<tr>
<td>UNISA</td>
</tr>
<tr>
<td>0003</td>
</tr>
</tbody>
</table>

You may also send an email to study-info@unisa.ac.za.

5.2 Tutorial classes at Learning Centres

Unisa offers tutor services for students as additional academic support at various Unisa regional learning centres throughout the country. For details of a learning centre near you, please consult Directorate Curriculum and Learning Development at Tel: +27 12 429 6889 or see the brochure Studies @ Unisa.

Tutors are appointed and tutorial classes will be held at some (but not necessarily all) of the learning centres. The decision to offer classes at a learning centre will depend on the number of students who register for these classes at that centre. If you have any queries about tutorial classes you are welcome to contact your nearest learning centre.

A tutorial is an organised session where students and tutor(s) meet regularly at a common venue and at scheduled times to discuss course material. Tutorials help the students to develop and enhance their learning experience and academic performance through interaction with the tutor and fellow students. Tutorials are not compulsory and willing students receive tutorial support at a nominal fee. Interested students are advised to consult the learning centre closest to them to enrol for tutorials.

5.3 Computer laboratories

Students in Gauteng, the Western Cape, KwaZulu-Natal and the Limpopo are welcome to make use of the computer laboratories available at the Learning Centres. In order to use these facilities you will first need to make a booking. You may contact the different computer laboratories for further information about the location, operating times and user conditions.

6 STUDY PLAN

As adults you will make your own decisions about when you do your work. Those of you who are employed or who have other responsibilities will have less time than those who are full-time students, but, as we mention in Book 1: Introduction, it is very important to set aside regular time to study, and to try to stick to your schedule. The closing dates for the assignments already provide the outline of a schedule for you. Based on these dates, you should thus try to keep to the following
plan. You may progress through the material faster and submit assignments earlier. In this way you will be safer and provide for unforeseen circumstances which may occur.

<table>
<thead>
<tr>
<th>Period</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>January – March</td>
<td>Work through Book 1; submit Assignment 01.</td>
</tr>
<tr>
<td>March – April</td>
<td>Study Book 2 and submit Assignment 02.</td>
</tr>
<tr>
<td>April – May</td>
<td>Revise Books 1 and 2; submit Assignment 03.</td>
</tr>
<tr>
<td>May – June</td>
<td>Work through Book 3; submit Assignment 04.</td>
</tr>
<tr>
<td>June</td>
<td>Revise Book 3 and submit Assignment 05.</td>
</tr>
<tr>
<td>July</td>
<td>Work through Book 4; submit Assignment 06.</td>
</tr>
<tr>
<td>July – August</td>
<td>Revise the work in all the books. Submit Assignment 07.</td>
</tr>
<tr>
<td>September and October</td>
<td>Carefully go through all the printed solutions you will have received and compare the solutions with your assignments. Also do the revision exercises.</td>
</tr>
</tbody>
</table>

See the brochure *Studies @ Unisa* for general time management and planning skills.

7  **PRACTICAL WORK AND WORK INTEGRATED LEARNING**

There are no practicals for this module.

8  **ASSESSMENT**

8.1  **Assessment criteria**

**Specific outcome 1:**
**Do operations on Real Numbers and use Basic Algebra Tools**

**Assessment criteria**

1.1 Recognition and use of the different kinds of numbers, number sets and set notations.

1.2 Operate on real numbers and obeying the rules.

1.3 Solve problems which involve ratio, proportion and percentage.

1.4 Apply the definitions of integral exponents, scientific notation and roots.

1.5 Convert units and derived units in the metric system to other units in the metric system or non-metric units to metric units and vice versa.

**Specific outcome 2:**
**Perform basic Algebraic operations by using Algebra tools**

**Assessment criteria**

2.1 Perform basic Algebraic operations like adding, subtracting, multiplying and dividing of algebraic expressions correctly, including working with Algebraic Fractions.
2.2 Solve Linear and Quadratic Equations and Inequalities, Equations containing Roots, and Systems of Equations in Two Unknowns, correctly.

2.3 Identify Arithmetic and Geometric Sequences and find specific terms of these sequences.

2.4 Solve Equations containing Exponents and Exponential Equations correctly, by applying the Definitions and Exponential Rules.

2.5 Solve Logarithmic Equations by applying the various properties of logarithms correctly.

2.6 Solve problems by applying the Compound Interest formulas, Appreciation and Depreciation formulas, Population Growth formula and Radio Active Decay and Half-Life Formulas correctly.

Specific outcome 3:
Plot Graphs and Interpret and Apply information on Given Graphs

Assessment criteria

3.1 Draw a graph by plotting points or by using a given equation.

3.2 Apply Analytical Geometry formulas to find the coordinates of a point, distances between points, midpoints, and equations of circles.

3.3 Interpret information on a given graph to find the solutions of equations or inequalities.

3.4 Find the \(x\)– and \(y\)–intercepts if the equation of a graph is given; determine whether or not a point lies on a given graph; find the \(x\) values for which \(y < 0\), \(y = 0\) or \(y > 0\).

3.5 Identify the correspondence in a relation, whether the relation is a function, and the domain and range of a given relation.

3.6 Recognise whether or when two functions are equal.

3.7 Use functional notation correctly and determine function values by substitution of given domain values.

3.8 Obtain new functions from existing functions by addition, subtraction, multiplication and division and the domains of these new functions.

3.9 Draw a straight line graph by using a table of values, two points or the point – slope method. Also draw vertical, horizontal, parallel and perpendicular lines,

3.10 Find the slope-intercept, point-slope, two-point or general equation of a line.

3.11 Find the intersection of two lines; or the vertical distance between two lines.

3.12 Apply knowledge of linear functions to problems involving linear cost- and income functions.

3.13 Sketch the graph of a linear inequality and the graph of the solution of a system of linear inequalities.

3.14 Recognise equations which show direct, indirect or joint proportionality amongst different variables.
3.15 Recognise the characteristics, sketch the graph, find the maxima or minima and find the equation (if three points on the parabola, or the vertex and another point on the parabola or the \( x \)-intercepts and another point on the parabola are given) of a parabola defined by

\[
y = ax^2 + bx + c \quad \text{and} \quad y = a(x-h)^2 + k.
\]

3.16 Use a rough sketch of a parabola to solve a quadratic inequality or rational inequality.

3.17 Recognise the characteristics of a hyperbola; sketch the graph of a hyperbola and find the equation of a hyperbola if a point on the hyperbola or the closest distance from the origin to the hyperbola is given.

3.18 Interpret various combinations of graphs.

**Specific outcome 4:**

*Use Statistics to determine valuable information from collected data.*

**Assessment criteria**

4.1 Use the terminology of Statistics correctly.

4.2 Organise data in a table in a meaningful way.

4.3 Use pie graphs, histograms, frequency polygons and stem-and-leave plots to represent raw ungrouped or grouped data.

4.4 Determine the median, mode, arithmetic mean or mean deviation of a set of data (grouped or raw).

4.5 Apply the terminology of probability: outcome, sample space, event.

4.6 Calculate the empirical probability of a given event.

**Specific outcome 5:**

*Develop Geometry Skills based on an understanding of basic Geometry Principles.*

**Assessment criteria**

5.1 Translate an object in a specific direction or reflect an object in a specific line, e.g. a vertical or horizontal line.

5.2 Define a line, line segment, ray, angle, coincident lines, parallel lines, and perpendicular lines.

5.3 Classify angles according to measure and relationship with other angles; recognise the relationship between parallel lines cut by a transversal line and the resulting corresponding, alternate and co-interior angles.

5.4 Recognise polygons that are congruent or similar; determine the scale factor for the enlargement or reduction of a given object; draw diagonals and altitudes of any polygon.

5.5 Classify triangles according to the lengths of their sides or the measure of their angles; apply the conditions for triangles to be congruent or similar.
5.6 Use the Theorem of Pythagoras.

5.7 Classify quadrilaterals according to whether their sides are parallel, or equal in length: i.e. a Kite, a Parallelogram, a Rhombus, a Rectangle, or a Square.

5.8 Use the terminology of circles: centre, radius, chord, diameter, arc, semi-circle, tangent, and central angle subtended by an arc.

5.9 Calculate the perimeters or circumference and areas of various polygons like circles, rectangles, triangles, parallelograms, and trapeziums.

5.10 Calculate the surface area and volume of a three dimensional object like a pyramid, a rectangular prism, a cube, a right circular cylinder, a right circular cone and a sphere.

8.1.1 The content of the four study guides

Book 1: Number Skills
- The Set of Real numbers
- Operations on real numbers
- Ratio, Proportion and Percentage
- Integral (integer) exponents, Scientific Notation and Roots
- Units of measurements

Book 2: Algebra Tools
- Algebraic Expressions
- Equations and inequalities
- Sequences
- Exponents and Logarithms

Book 3: Graphs and Statistics
- Analytic Geometry
- Relations and Functions
- Straight lines
- Parabolas
- Hyperbolas
- Combination of Graphs
- Statistics

Book 4: Geometry and Measurement of Areas and Volumes
- Geometry
- Perimeter, Area and Volume

8.2 Assessment plan

**VERY IMPORTANT NOTICE TO STUDENTS!!**

Due to an important rule of the university, a student must submit at least one assignment to reach Unisa BEFORE 20 MAY 2017 to be considered as an active student.
8.2.1 Assignments and closing dates

The assignments for MAT0511 serve different teaching purposes. In certain cases the assignment questions are a direct application of the work discussed in a single study unit, but often you will need to bring together “bits” of knowledge, related to several different sections, in order to answer the questions.

There are seven compulsory assignments for MAT0511. Six of these relate to the work dealt with in Books 1 to 4. The final assignment is a revision assignment which consists of the October/November 2016 exam paper. This assignment will be sent to you in a separate tutorial letter (TL102) very early in the year. Look out for it.

Each assignment has a specific (fixed) closing date. Please send in your assignments in good time, allowing for slow postage if you know you live in an area where there are sometimes postal delays. You should post your assignment at least 7 days before the due date. After the closing date, the assignments will be marked, and returned with our comments. Late arrivals will also be marked, but a mark of 0 will be awarded. Make a copy of your assignment answers for unforeseen circumstances.

We cannot grant students extension for assignment submission, since all students will automatically receive solutions for the assignments after their respective closing dates. If you do not submit an assignment in time, please try to do it anyway, before looking at the solutions. You will learn more in this way than from simply reading through the correct solutions we send you.

8.2.2 Assessment of assignments

Please note: Although students may work together when preparing assignments, each student must write and submit his or her own individual assignment. In other words, you must submit your own ideas in your own work. It is unacceptable for students to submit identical assignments on the basis that they have worked together. That is copying (a form of plagiarism) and none of these assignments will be marked. Furthermore, you may be penalised or subjected to disciplinary proceedings by the University.

8.2.3 Solutions and feedback on assignments

You will receive the correct answers automatically for multiple-choice questions. For written assignments, markers will comment constructively on your work. However, solutions on all assignments will be sent to all students registered for this module in a follow-up tutorial letter, and not only to those students who submitted the assignments. The tutorial letter number will be 201, 202, etc.

As soon as you have received the solutions, please check your answers. The assignments and the solutions and feedback on these assignments constitute an important part of your learning and should help you to be better prepared for the next assignment and the examination.

8.2.4 Year Mark (Counts toward final mark)

Your year mark counts 20% of your final mark and your examination mark counts 80% of your final mark. Your year mark is calculated according to the different weights the different assignments
carry. The four multiple choice assignments count 48% of the year mark and the three written assignments count 52% of the year mark. If you do not submit an assignment, the mark for that assignment is taken to be 0.

**Note the following points:**

1. It is to your advantage to submit all the assignments.
2. Assignments reaching us after the closing dates will be marked but will not contribute towards the year mark and is taken to be 0%.

### 8.3 General assignment numbers

Assignments are numbered consecutively starting from 01. For example 01, 02, 03 and so on.

#### 8.3.1 Unique assignment numbers

In addition to the general assignment number (eg. 01), all assignments (multiple-choice and written) have their own unique assignment number (e.g. 804237). This number is given at the beginning of each assignment. Make sure that you use the correct unique number when you complete the cover page of your assignment answer as required.

#### 8.3.2 Due dates of assignments

The due dates for the submission of the assignments in 2016 are:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Closing date</th>
<th>Type of assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 (Book 1)</td>
<td>20 March</td>
<td>Multiple choice</td>
</tr>
<tr>
<td>02 (Book 2)</td>
<td>24 April</td>
<td>Multiple choice</td>
</tr>
<tr>
<td>03 (Books 1 and 2)</td>
<td>15 May</td>
<td>Written</td>
</tr>
<tr>
<td>04 (Book 3)</td>
<td>20 June</td>
<td>Multiple choice</td>
</tr>
<tr>
<td>05 (Book 3)</td>
<td>11 July</td>
<td>Written</td>
</tr>
<tr>
<td>06 (Book 4)</td>
<td>25 July</td>
<td>Multiple choice</td>
</tr>
<tr>
<td>07 (Revision: 2015 exam)</td>
<td>08 August</td>
<td>Written</td>
</tr>
</tbody>
</table>

#### 8.3.3 Submission of assignments

Students may submit written assignments and assignments done on mark–reading sheets by post or Mobile MCQ submission or electronically via myUnisa. Assignments may not be submitted by fax or e-mail.

**Electronically via myUnisa by using the internet**

Note:

You must join myUnisa (our Online Campus) before you can submit assignments through the internet. To join myUnisa go to [https://my.unisa.ac.za](https://my.unisa.ac.za), click on “Join myUnisa” and follow the instructions.
You must have an **e-mail address** before you can join myUnisa. If you do not have one, you can get a free e-mail address at one of the following websites:

- [http://www.unisa.ac.za](http://www.unisa.ac.za) ("Access myLife email account")
- [http://www.gmail.com](http://www.gmail.com)
- [http://www.webmail.co.za](http://www.webmail.co.za)
- [http://www.yahoo.com](http://www.yahoo.com)
- [http://www.hotmail.com](http://www.hotmail.com)

It is very simple to submit multiple choice assignments via myUnisa. Please do not submit written assignments via myUnisa if your software does not have the **correct mathematical symbols** and if you are unable to do **sketches**, for example number lines and graphs.

**To submit an assignment via myUnisa:**

Go to *myUnisa*.

Log in with your student number and password.

Select the course code of the module from the orange bar.

Click on “assignments” in the left-hand side of the screen.

Click on the assignment number you want to submit.

Follow the instructions.

Note: For detailed information and requirements as far as assignments are concerned, see the *Studies @ Unisa* brochure, which you received with your study package.

### 8.4 Assignments

The assignment questions are contained in Addendum A.

- Assignment 1, pages 19–24
- Assignment 2, pages 25–31
- Assignment 3, pages 32–34
- Assignment 4, pages 35–42
- Assignment 5, pages 43–44
- Assignment 6, pages 45–52
- Assignment 7, page 53

Solutions to the assignments will be posted to ALL students registered for this module a while after the closing date of the relevant assignment. Solutions will also be available on *myUnisa*.

### 9 EXAMINATIONS

#### 9.1 October/November 2017

All students who submit all their assignments on time, automatically qualify to write the exam at the end of the academic year. The duration of the examination is three hours.

Students who do not submit all their assignments, may also be admitted if they qualify as an active student (See 8.1). Not submitting an assignment will definitely affect a student’s year mark.
During the year the examination section will provide you with information regarding the examination in general, exam venues, exam dates and exam times. You can also visit the Unisa website for such information.

For general examination guidelines and examination preparation guidelines, see the brochure *Studies @ Unisa*.

### 9.2 Beginning of 2018 (Supplementary exam)

If you are not successful in the October/November exam (i.e. if you have less than 50%) you may write the supplementary exam in January provided that you obtain at least 40% for the October/November exam. Supplementary examination dates will be provided by the Examination Section.

### 9.3 Missing an exam

Please consult the Unisa booklet: *Studies @ Unisa* for information regarding the correct procedures to follow if you miss an exam for any serious reason (such as illness).

### 9.4 The use of calculators

In the study material there are examples and exercises where you need to use a pocket calculator to find the final answer. A pocket calculator is a very useful tool and you need to be familiar with its functions.

However, for a variety of reasons, you are not allowed to use a pocket calculator in the examination.

Since calculators are not permitted in the exam, and because it is useful to be able to do calculations in your head, it is a good idea to practise doing arithmetic calculations mentally as often as you can. For example, if you need to calculate $\frac{63 \times 77}{99}$, try to simplify the numbers and do a mental calculation instead of grabbing the calculator! If you look carefully, you will see that

$$\frac{63 \times 77}{99} = \frac{9 \times 7 \times 7 \times 11}{9 \times 11} = \frac{7 \times 7}{11} = 7 \times 7 = 49.$$

We set the assignment questions in such a way that you very rarely need to use a calculator. The 2016 October/November exam paper will illustrate the way in which questions are asked to avoid the need of a calculator.

### 9.5 Previous exam papers

Previous exam papers are available to students on myUnisa.
10 OTHER ASSESSMENT METHODS

There are no other assessment methods for this module.

11 FREQUENTLY ASKED QUESTIONS

The Studies @ Unisa brochure contains an A-Z guide of the most relevant study information. Please refer to this brochure for any other questions.

12 CONCLUSION

We trust that you will have a very successful academic year. Remember, you are important to us and we are very willing and available to assist you with your course content related problems.

Our best wishes

Your MAT0511 lecturers.
ADDENDUM A: ASSIGNMENTS

A.1 Assignment 01

Important:

• This is a multiple choice assignment which may be answered on a MARK READING SHEET and then posted to the university, or may be completed and submitted online using myUnisa. Before answering the assignment please read the instructions in the Unisa brochure: my STUDIES @ Unisa, especially the section on completing and submitting mark-reading sheets and the section on submitting multiple-choice assignments via myUnisa.

• Always keep your rough detailed working so that you can compare your solutions with those that will be sent to you. Also keep a copy of your answers/options. You may need it later.

• 5 marks will be given for every correct answer.

Note: Small letters of the alphabet represent real numbers, unless otherwise stated.

Question 1
Suppose

\[ P = [-5, 0) \] and \[ Q = \{ x \in \mathbb{R} : -3 < x \leq 2 \} , \]

which of the following is/are true?

A. \( P \cup Q \) can be represented by the following number line.

B. \( P \cap Q \) can be represented by the following number line.

C. \( 2 \in P \cap Q \).


Question 2
Which of the following is/are true?

A. \( 0, 1\hat{6} \) represents \( \frac{1}{6} \)

B. \( -\frac{1}{5} \not< -\frac{1}{4} \)

C. \( 0,3 < 0,3 \)
Question 3

Which of the following statements do (does) not represent the statement accompanying it:
A. \( p \) is at most 5: \( p \leq 5 \)
B. \( b \) is at least 8: \( b \geq 8 \)
C. \( w \) is positive and less than 17: \( 0 < w < 17 \)
D. \( y \) is greater than 5 or less than \(-1\): \( y > 5 \) or \( y < -1 \)
E. The maximum value of \( t \) is 7: \( t < 7 \)

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only A, C and E

Question 4

Which one of the following does NOT describe the set sketched above?

1. \( (-\infty, -2) \cup [3, \infty) \)
2. \( \{x \in \mathbb{R} : x < -2 \text{ or } x \geq 3\} \)
3. \( \{x \in \mathbb{R} : x < -2 \text{ and } x \geq 3\} \)
4. \( x \notin [-2, 3) \)
5. \( \{x \in \mathbb{R} : x < -2\} \cup \{x \in \mathbb{R} : x \geq 3\} \)

Question 5

Suppose \( A = \{0, 2, 4, 6\} \) and \( B = \{1, 2, 3, 5\} \). Which of the following is/are true?

A. \( A \cup B = \{2\} \)
B. \( A \cup B = [0, 6] \)
C. \( A \cup B = \{x \in \mathbb{Z} : 0 \leq x \leq 6\} \)

1. Only A 2. Only B 3. Only C
4. Only A and B 5. None of them

Question 6

Which of the following is/are true?

A. The LCM of 8, 10 and 12 is 120.
B. The HCF of 18, 36 and 27 is 3.
C. The prime factors of 18 are 2 and 9.

1. Only A 2. Only B 3. Only C
4. Only B and C 5. A, B and C
Question 7

Which of the following is/are true?

A. \(-\frac{1}{5} < -\frac{1}{4}\)

B. \(\frac{2}{5} \div \frac{1}{5} = 2\)

C. \(\frac{3}{5} + \frac{2}{3} = \frac{5}{8}\)

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only B and C

Question 8

5 – 2 (3 – 1) is equal to

1. 8 2. 6 3. 1 4. 11 5. −5

Question 9

Susan went to a jumble sale. After buying a pair of jeans for R36, 45, a top for R11, 90, a jersey for R42, 50, a jacket for R45, 00 and a shirt for R25, 80 she received R10, 35 change.

Which of the following statements is/are true? (Try to do the calculations without a calculator.)

A. The total cost of all the items bought was R172, 00.
B. Susan took R172, 00 from her purse when she paid for all the items.
C. To present the least number of notes and/or coins she used a two hundred note to pay.

1. Only A 2. Only B 3. Only C
4. Only A and B 5. A, B and C

Question 10

Which of the following is/are true?

A. 0, 019 \(\approx\) 0, 1 correct to one decimal place.
B. 0, 019 \(\approx\) 0, 02 correct to two decimal places.
C. 0, 0119 \(\approx\) 0, 01 correct to two decimal places.

1. Only A 2. Only B 3. Only C
4. Only A and C 5. Only B and C
Question 11

Which of the following is/are true?

A. A school has 30 teachers. If the ratio of the number of female teachers to the number of male teachers in the school is 3 : 2, there are 12 male teachers at the school.
B. Suppose Peter paints a room in $x$ hours, and Paul works twice as fast as Peter. Then Paul takes $2x$ hours to paint the room.
C. The ratio of $3\frac{1}{5}$ to $5\frac{1}{3}$ is $3 : 5$.
D. $0.5\%$ of 250 is 125.


Question 12

A lounge suite is on sale for 15% off its original price. On the sale the price of the suite is R8 000. The original price of the suite can be calculated in the following way:

1. $\frac{8000 \times 100}{85}$  2. $8000 - \frac{15 \times 8000}{100}$  3. $\frac{115}{100} \times 8000$
4. $8000 + \frac{15 \times 8000}{100}$  5. $\frac{85}{100} \times 8000$

Question 13

Sipho runs 10% faster than Elias. The ratio of the speeds at which Joseph and Ben run is 4 : 5. The ratio of the speeds at which Adam and Sipho run is 9 : 8. Adam’s speed is 90% of Joseph’s speed. Who runs the fastest?


Question 14

Which of the following statements is/are true?

A. $0^0 = 0$  B. $1^0 = 0$  C. $2^0 = 1$

Question 15

Which of the following statements is/are true?

A. $\sqrt{-4} = -2$
B. $\sqrt{(-2)^2} = -2$
C. $\sqrt{(-3)^2} = 3$

1. Only A 2. Only B 3. Only C
4. Only A and B 5. A, B and C

Question 16

Which of the following is/are true?

A. $\sqrt{16 + 9} = 7$
B. $\sqrt{16} \sqrt{9} = 12$
C. $\sqrt{\frac{3}{5}} = \frac{\sqrt{15}}{5}$

1. Only A 2. Only B 3. Only C
4. Only B and C 5. A, B and C

Question 17

Which of the following is/are true?

A. $(a + b)^2 = a^2 + b^2$
B. $2^3 + 2^4 = 2^7$
C. $2^3 \cdot 2^4 = 4^7$

1. Only A 2. Only B 3. Only C
4. Only A and C 5. None of them

Question 18

Which of the following numbers is/are in scientific notation?

A. $0.031 \times 10^4$
B. $345 \times 10^{-3}$
C. $1,1237 \times 10^{-20}$

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only A and C
Question 19

The decimal number 105 is represented in binary notation as:

1. 1 1 1 1
2. 1 1 0 1 0 0 1
3. 1 0 1 1
4. 1 1 1 0 1
5. 1 0 1 0 1 0

Question 20

20 g/m² is equal to how many kilograms per hectare? (Hint: 1 hectare = 1 square hectometer.)

1. $20 \times 10^4$ kg/hectar
2. $20 \times 10^{-4}$ kg/hectar
3. $20 \times 10^{-2}$ kg/hectar
4. 200 kg/hectar
5. 20 kg/hectar

TOTAL: [100]
A.2 Assignment 02

Important:

• This is a multiple choice assignment which may be answered on a **MARK READING SHEET** and then posted to the university, or may be completed and submitted online using myUnisa. Before answering the assignment please read the instructions in the Unisa brochure: *my STUDIES @Unisa*, especially the section on completing and submitting mark-reading sheets and the section on submitting multiple-choice assignments via myUnisa.

• Always keep your rough detailed working so that you can compare your solutions with those that will be sent to you. **Also keep a copy of your answers/options. You may need it later.**

• 5 marks will be given for every correct answer.

In each of the following questions small letters of the alphabet (i.e. *a*, *b*, *x*, etc.) represent real numbers.

**Question 1**
Assume \(x \in \mathbb{R}\) and \(-1 < x < 0\).
Which of the following is/are true?

A. \(-2(x - 1) = 2 - 2x\)

B. \(\frac{1}{x} < 0\)

C. \(\frac{1}{x} < -1\)

1. Only A 2. Only B 3. Only C
4. Only A and C 5. A, B and C

**Question 2**
Which of the following is/are true?

A. If \(x = a - 1\) and \(y = 2b\) then \(x^2 - 1 + xy = a^2 - 2a - 2b + 2ab\).

B. \(\sqrt{a + b}\) is defined for \(-b \leq a\).

C. \(\frac{a^2 - b^2}{a + b} = a - b\)

1. Only A 2. Only B 3. Only C
4. Only A and C 5. A, B and C
Question 3
If the expression
\[
\frac{3(a+2)}{a^2-1} \div \frac{a^2-4}{2a^2+2a}
\]
is simplified, we obtain
1. \( \frac{6a}{(a-1)(a-2)} \)
2. \( \frac{3(a-2)(a+2)^2}{2a(a-1)(a+1)^2} \)
3. \( 6a(a+1)(a+2) \)
4. \( \frac{(a-1)(a-2)}{6a} \)
5. \( \frac{2a(a-1)(a+1)^2}{3(a-2)(a+2)^2} \)

Question 4
Which of the following is/are true?

A. In the expression \( a^2 - 2ab - 3ab^2 + 4b^3 \) there are four terms.

B. \( x \) and \( \frac{1}{x} \) are like terms.

C. \( \frac{2p^2 - 2p + 1}{2p - p^2} \) is a rational expression.

1. Only A 2. Only B 3. Only C 4. Only A and B 5. None of them

Question 5
Which of the following statements is/are true?

A. \[ \frac{a^3 + 8b^3}{3a-b} \div \frac{a+2b}{3a^2+5ab-2b^2} = (a+2b)(a-2b)^2 \]

B. \[ \frac{a}{a+b} + \frac{b}{b+c} + \frac{c}{c+d} = \frac{1}{b} + \frac{1}{c} + \frac{1}{d} \]

C. By completing the square the expression \( \frac{1}{3}x^2 + 2x - 1 \) can be written as \( \frac{1}{3}(x+3)^2 - 4 \).

Question 6
The solution set of $x + 2 < 2x - 3 \leq x + 1$ is

1. $\{x \in \mathbb{R} : x \leq 4\}$
2. $\phi$
3. $\{x \in \mathbb{R} : x \leq 4\} \cup \{x \in \mathbb{R} : x > 5\}$
4. $\{x \in \mathbb{R} : x > 5\}$
5. $\{x \in \mathbb{R} : 4 \leq x < 5\}$

Question 7
Which of the following is/are true?

A. The solution of $(2x + 1)(x + 1) = 1$ is $x = -\frac{1}{2}$ or $x = -1$.
B. The solution set of $\sqrt{(x - 1)^2 + 2x} = 0$ is $\{-1, \frac{1}{3}\}$.
C. The equation $6x^2 - 5x + 5 = 0$ has no real roots.

1. Only A 2. Only B 3. Only C
4. Only B and C 5. A, B and C

Question 8
Which of the following is/are true?

A. $x^2 < a \iff x \in (-\sqrt{a}, \sqrt{a})$
B. $x^2 \geq a \iff x \leq -\sqrt{a}$ or $x \geq \sqrt{a}$
C. $x \in (-\infty, -\sqrt{a}) \cup (\sqrt{a}, \infty) \iff x^2 \geq a$

1. Only A 2. Only B 3. Only C
4. Only A and B 5. A, B, and C

Question 9
Suppose $\frac{1}{v} - \frac{1}{u} = \frac{m - 1}{r}$.
Which of the following is/are true?

A. The equation is defined provided $v \neq 0$, $u \neq 0$ and $r \neq 0$.
B. $v = \frac{r}{m - 1} + u$
C. If $u < v$ then $\frac{m - 1}{r} > 0$.

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only A and C
Question 10
Suppose it takes Pete \( x \) hours to paint a room. It takes Gerry 10 minutes longer than Pete to paint the room. If Thabo paints twice as fast as Gerry he will take 3 hours to paint the room. Which of the following equations describe how long it will take Pete to paint the room?

1. \( \frac{1}{2} (x + 10) = 3 \)
2. \( 2 \left( x + \frac{1}{5} \right) = 3 \)
3. \( x + \frac{x}{6} = 6 \)
4. \( \frac{1}{2} \left( x + \frac{1}{6} \right) = 3 \)
5. \( 2 (x + 10) = 3 \)

Question 11
A plumber charges a call-out fee of R90, plus R120 per hour to do a job. How many hours did he work if the spares needed cost R200 and the total bill was R840?

1. 7 hours
2. 4 hours and 35 minutes
3. 6\frac{1}{4} hours
4. 9 hours and 25 minutes
5. There is insufficient information to answer the question.

Question 12
Which of the following is/are true?

A. Suppose the difference between two numbers \( a \) and \( b \) is 10, and \( a > b \). If the product of the numbers is 24, then numbers \( a \) and \( b \) can be found by solving

\[
\begin{align*}
   \begin{cases}
   a - b = 10 \\
   ab = 24
   \end{cases}
\end{align*}
\]

B. The solution of the system

\[
\begin{align*}
   \begin{cases}
   2x - y = -1 \\
   y^2 - x^2 = \frac{7}{4}
   \end{cases}
\end{align*}
\]

is \( x = \frac{1}{6} \) and \( y = \frac{4}{3} \), or \( x = -\frac{3}{2} \) and \( y = -2 \).

C. The solution of the system

\[
\begin{align*}
   \begin{cases}
   2a - 3b = 2 \\
   2a + b = 3
   \end{cases}
\end{align*}
\]

is \( a = \frac{13}{8} \), \( b = -\frac{1}{4} \).

1. Only A
2. Only B
3. Only C
4. Only A and B
5. Only A and C
Question 13
Which of the following is/are true?

A. 1, −1, 1, −1, ... is a geometric sequence.
B. The first six elements in the set of consecutive triangular numbers form an arithmetic sequence.
C. The elements in any set of consecutive natural numbers form an arithmetic sequence.

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only A and C

Question 14
The first three terms of an arithmetic sequence are 3, 8 and 13. Which of the following is/are true?

A. The 10th term of the sequence is 53.
B. There are four prime numbers in the first 8 terms of the sequence.
C. The first term that will exceed 148 is the 31st term.

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only B and C

Question 15
Which of the following is/are true?

A. The sixth term of the geometric sequence −0.3; 0.09; −0.0027; ... is −0.00729.
B. If the fourth term of a geometric sequence is \(2/3\) and the ninth term is \(64/729\), the first term is \(9/4\).
C. Suppose \(x\), \(x-1\) and \(x-4\) are consecutive terms in a geometric sequence. To find \(x\), and hence the other given terms in the sequence, we solve the equation \(x(x-1) = x-4\).

1. Only A 2. Only B 3. Only C
4. Only A and B 5. A, B and C

Question 16
Which of the following is/are true?

A. Suppose \(a \in \mathbb{R}\), \(n \in \mathbb{N}\) and \(n \geq 2\). If \(\sqrt[n]{a}\) exists, then \(a^{1/n} = \sqrt[n]{a}\).
B. If \(a \in \mathbb{R}\), \(n \in \mathbb{N}\), \(n \geq 2\) and \(n\) is even, then \(\sqrt[n]{a}\) only exists if \(a \geq 0\).
C. If \(a \in \mathbb{R}\), \(n \in \mathbb{Z}\), \(n > 2\) and \(n\) is odd, then \(\sqrt[n]{a}\) exists for all \(a\).

1. Only A 2. Only B 3. Only C
4. Only A and B 5. A, B and C
Question 17
Which of the following statements is/are true?

A. \((2x + 3y)^2 = (2x)^2 + (3y)^2\)

B. \((-a)^{-x} = a^x\)

C. \(a^{\frac{1}{2}} + b^{\frac{1}{2}} = \frac{\sqrt{a + \sqrt{b}}}{\sqrt{ab}}\)

1. Only A          2. Only B          3. Only C
4. A, B and C      5. None of them

Question 18
The solution of \(2^{2x} - 3.2^x - 4 = 0\) is

1. \(x = 2\)
2. \(x = -1\) or \(x = 4\)
3. \(x = 0\) or \(x = 2\)
4. \(x = 1\) or \(x = -4\)
5. \(x = 0\)

Question 19
Which of the following is/are true?

A. \((0.01)^{-x} = 10^{2x}\)

B. The 5th term of a geometric sequence is 36 and the 10th term is 152. The common ratio \(r\) is thus 2 and the first term is \(\frac{9}{7}\).

C. The solution of \(\log_2 (x - 3) + \log_2 (x - 4) - 1 = 0\) is \(x = 2\) or \(x = 5\).

1. Only A          2. Only B          3. Only C
4. Only A and B    5. Only B and C
Question 20
Which of the following is/are true?

A. Suppose a factory has machinery which depreciates at 10% per year. The machinery was worth R50 000 at the beginning of 2004. By the end of 2007 it will be worth R36 450.

B. A population’s growth/decay is described by means of the formula

\[ N = N_0 e^{kt} \]

where \( k = -0.54 \). The population is thus decreasing.

C. Suppose an initial sum of R20 000 is invested at an annual rate of 6%, and interest is compounded twice per year. If the investor wants to save until the amount has increased to R24 000, she will need to save the money for \( 3 \frac{1}{2} \) years.

1. Only A  
2. Only B  
3. Only C  
4. Only A and B  
5. Only B and C

TOTAL: [100]
A.3 Assignment 03

ASSIGNMENT 03
Study material: Book 1 and 2
Fixed closing date: 15 May 2017
Unique Assignment Number: 809937

- Make sure you make a **copy of your assignment** answer before you post it.
- Show all the steps of your working and give your reasons clearly. Give a proper conclusion to your answers where applicable.

**Question 1**

A = \([-3, 4]\)

B = \(\{x \in \mathbb{R} : -4 < x \leq 2 \text{ or } x > 3\}\)

1. Sketch the sets A and B on two separate number lines. (2)
2. Determine \(A \cup B\) and write the answer in interval notation. (1)
3. Determine \(A \cap B\) and write the answer in set builder notation. (2)

**Question 2**

2.1 Explain why 0,\(\frac{3}{2}\) > 0,032. (2)

2.2 Show that 0,\(\frac{3}{2}\) is a rational number. (2)

**Question 3**

3.1 As a waitress Sarah earns R100 per night and commission of 7.5% on her takings. Phewa earns R120 per night and a commission of 5%. How much business must each of the waitresses bring in per night, in order for each to earn R400? (3)

3.2 Sarah’s friend Rose in London is also a waitress, but she earns only a basic salary of £3.50 per hour. On a particular day the exchange rate was R11.50 = £1.00. How much (to the nearest rand) did Rose earn if she worked for six hours on that day? (2)

**Question 4**

Suppose the price of a pair of shoes, including VAT at a rate of 14%, was R240,00. On a sale, the price was reduced by 15%.

4.1 How much was the VAT amount before the sale? (3)

4.2 What was the price of the shoes (including VAT) on the sale? (2)
Question 5

5.1 Solve the following inequality for $x$:
\[ 5x - 3x^2 \geq 2. \] (3)

5.2 Without trying to solve the equation $3x^2 - 5x + 7 = 0$, how would you know that it has no real roots? (2)

5.3 Find the value of $k$ for which the equation $3x^2 - kx + 7 = 0$ will have two real solutions. (2)

Question 6

Towns A and B are 300km apart. A man travels from A to B at a speed of 120km/h and a woman travels from B to A at a speed of 80km/h. The woman begins her journey 15 minutes after the man does. How far away from B will they meet? (4)

Question 7

Solve the following equation:
\[ 2^{x+3} = \frac{64x}{8}. \] (3)

Question 8

Consider the geometric sequence
\[ 2, \ 2\sqrt{2}, \ 4, \ 4\sqrt{2}, \ \ldots \]

8.1 What is the common ratio, $r$? (1)

8.2 Find the 10th term in this sequence. (1)

8.3 If every alternate term, from the first term onwards, is removed from this sequence, will the new sequence also be a geometric sequence? Explain your answer. (Note: Start by removing the first term.) (1)

Question 9

Suppose $\frac{x}{3}$, $x$ and $x + 8$, where $x \in \mathbb{Z}$ and $x \neq 0$, are consecutive terms in a geometric sequence. Calculate $x$. (2)

Question 10

Consider the equation
\[ \log_2 x + \log_2 (x - 1) = 1. \]

10.1 State the values of $x$ for which the equation is defined. (1)

10.2 Solve the equation for $x$. (4)
Question 11
How much money does William need to invest now so that the investment is worth R12 000 in 3 years time, if the annual interest rate is 8% and interest is compounded quarterly? Give your answer to the nearest rand. (You will need to use a calculator.) [3]

Question 12
Strontium–90 has a half-life of 29 years. How long will it take for an initial sample of 10 mg to decay to 1 mg? (You will need to use a calculator.) [4]

TOTAL: [50]
A.4 Assignment 04

ASSIGNMENT 04
Study material: Book 3 (Topics 1–6)
Fixed closing date: 20 June 2017
Unique Assignment Number: 856425

Important:

- This is a multiple choice assignment which may be answered on a MARK READING SHEET and then posted to the university, or may be completed and submitted online using myUnisa. Before answering the assignment please read the instructions in the Unisa brochure: my STUDIES @ Unisa, especially the section on completing and submitting mark-reading sheets and the section on submitting multiple-choice assignments via myUnisa.

- Always keep your rough detailed working so that you can compare your solutions with those that will be sent to you. Also keep a copy of your answers/options. You may need it later.

- 4 marks will be given for every correct answer.

Note: Small letters of the alphabet represent real numbers, unless otherwise stated.

Question 1
A triangle $ABC$ has vertices $A (1, 3), B (1, -2)$ and $C (-4, -2)$.

Which of the following is/are true?

A. $d(B, C) = \sqrt{41}$
B. $\hat{C} = 90^\circ$
C. The midpoint of the hypotenuse is $\left( -\frac{3}{2}, \frac{1}{2} \right)$.

1. Only A
2. Only B
3. Only C
4. Only A and C
5. Only B and C

Question 2
The circle with equation $x^2 + y^2 - 2x + 4y = 0$ has centre $C$ and radius $r$, where

1. $C(1, -2); \ r = \sqrt{5}$
2. $C(-1, 2); \ r = \sqrt{5}$
3. $C(1, -4); \ r = \sqrt{17}$
4. $C(-1, 4); \ r = 17$
5. $C(1, -2); \ r = 5$

Question 3
The diameter of a circle has endpoints $P(0, 0)$ and $Q(8, -4)$. The equation of the circle is

1. $(x - 8)^2 + (y + 4)^2 = \sqrt{20}$
2. $(x - 4)^2 + (y + 2)^2 = 20$
3. $(x + 4)^2 + (y - 2)^2 = 2\sqrt{5}$
4. $x^2 + y^2 = 4\sqrt{5}$
5. $(x - 4)^2 + (y + 2)^2 = \sqrt{80}$
Question 4
Which of the following statements is/are true?

A. \( y = -\frac{1}{2}x + 3 \) represents a function.
B. \( x^2 + y^2 = 25 \) represents a function.
C. \( y = 2x^2 + 7x + 3 \) represents a function.

1. Only A 2. Only B 3. Only C
4. Only A and C 5. A, B and C

Question 5
Which of the following statements is/are true?

A. \( y = -\frac{1}{2}x + 3 \) does not define a one-to-one function.
B. \( x^2 + y^2 = 25 \) does not define a one-to-one function.
C. \( y = 2x^2 + 7x + 3 \) does not define a one-to-one function.

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only B and C

Question 6
Let \( f, g \) and \( h \) be functions defined as follows:

\[
 f(x) = \frac{\sqrt{x^2 - 3x + 2}}{2x - 3}, \quad g(x) = \frac{3}{\sqrt{x + 3}} \quad \text{and} \quad h(x) = \frac{x^2 - 5x + 6}{x - 2}.
\]

Which of the following is/are true?

A. \( D_f = \{ x \in \mathbb{R} : x \leq 1 \text{ or } x \geq 2 \} \)
B. \( D_g = \{ x \in \mathbb{R} : x \geq -3 \} \)
C. \( D_h = \mathbb{R} \)

1. Only A 2. Only B 3. Only C
4. Only A and C 5. Only B and C

Question 7
Which of the following statements is/are true?

A. If \( f(x) = e^x \), then \( f(x) \cdot f(-x) = 1 \).
B. If \( g(x) = \frac{1}{x} \), then \( g \left( \frac{1}{x} \right) = x \).
C. If \( h(x) = \sqrt{x + 2} \), then \( h(2) = \pm 2 \).

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only A and C
Question 8
Which of the following statements is/are true?

A. All straight lines are graphs of linear functions.
B. All circles are graphs of quadratic functions.
C. All parabolas are graphs of quadratic functions.


Question 9
The general equation of a line through (4, 0) which is parallel to the line containing points (1, 0) and (3, −1) is

1. $y = 2x + 2$
2. $x + 2y - 4 = 0$
3. $y = 2(x - 4)$
4. $2x - y + 8 = 0$
5. $2x + y - 8 = 0$

Question 10
The equation of the line through the point (3, 3) and perpendicular to the line $2y + 3x = 0$ is

1. $y = -\frac{3}{2}x + 1$
2. $y = \frac{3}{2}x + 5$
3. $y = -\frac{3}{2}x + 1$
4. $y = \frac{3}{2}x + 1$
5. $y = \frac{3}{2}x + 1$

Question 11
The general form of the equation of the line sketched above is

1. \(-2x + 3y + 6 = 0\)
2. \(y + 2 = 0\)
3. \(-2x + 3y = 0\)
4. \(3x - 2y - 6 = 0\)
5. \(-2x + 3y - 6 = 0\)

**Question 12**
A furniture manufacturer produces chairs. The daily fixed costs for the production of these chairs are R1 200. The cost of producing one chair is R50. The chair sells at R150. Suppose he sells all the chairs that he produces each day. Furthermore, let \(x\) be the number of chairs sold per day and let \(y\) be an amount in rands. Which of the following statements is/are true?

A. The equation for the cost function is \(y = 50x\).
B. The equation for the income function is \(y = 150x\).
C. If the manufacturer produces and sells 32 chairs in a day he will make a profit of R2 000.

1. Only A  
2. Only B  
3. Only C  
4. Only A and B  
5. Only B and C

**Question 13**
Consider the graph that represents the inequality \(-3x - y \geq 2\). Which of the following statements is/are true?

A. The graph consists of all the points above or on the line defined by \(-3x - y = 2\)
B. The graph consists of all the points below or on the line defined by \(y = -3x - 2\)
C. The graph consists of all the points above or on the line defined by \(3x + y + 2 = 0\)

1. Only A  
2. Only B  
3. Only C  
4. Only A and B  
5. Only A and C

**Question 14**
Consider the function defined by

\[
f = \{(x, y) : x \in \mathbb{R}, \ y = -(x - 3)^2 + 2\}.
\]

Which of the following statements is/are true?

A. The arms of the graph of \(f\) open upwards.
B. The graph of \(f\) has two \(x\)-intercepts.
C. The range of \(f\) is \(\{y \in \mathbb{R} : y \leq 2\}\).

1. Only A  
2. Only B  
3. Only C  
4. Only A and B  
5. Only B and C

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Question 15
Suppose \( f \) is the function defined by \( y = x^2 - 3x + 2 \) and \( g \) is the function defined by \( y = 4 - 3x \). Then the graph of the function \( g - f \)

1. reaches a minimum in the vertex \((-1, 2)\)
2. reaches a maximum in the vertex \((-3, 15)\)
3. reaches a maximum in the vertex \((0, 2)\)
4. reaches a minimum in the vertex \((3, -24)\)
5. reaches a minimum in the vertex \((\frac{1}{2}, \frac{1}{3})\)

Question 16
Which of the following graphs represents the equation \( y = -x^2 - 2x + 3 \)?

1. 
2. 
3.

4. 
5.

Question 17
The solution of \( \frac{2x}{1 - x} \geq 0 \) is

1. \( 0 \leq x \leq 1 \)
2. \( 0 \leq x < 1 \)
3. \( x < 0 \) or \( x \geq 1 \)
4. \( x \leq 0 \) or \( x > 1 \)
5. \( x < 0 \) or \( x > 1 \)
Question 18
Suppose the function \( f \) is defined by \( 4xy + 1 = 0 \).
Which of the following statements is/are true?

A. The graph of \( f \) intersects the line \( y = x \) in two points.
B. The function \( f \) is not defined for \( x = 0 \).
C. The shortest distance from the origin to a point on the graph of \( f \) is 1 unit.

1. Only A 2. Only B 3. Only C
4. Only A and B 5. Only A and C

Question 19
Consider the figure below. The centre of the circle is in the origin.

Which of the following statements is/are true?

A. The equation of the circle is \( x^2 + y^2 = 25 \).
B. The equation of the hyperbola is \( xy = 5 \).
C. The coordinates of \( G \) are \((-\sqrt{5}, -\sqrt{5})\).

1. Only A 2. Only B 3. Only C
4. Only A and C 5. Only B and C

Question 20
The force \( F \) between two small electrical charges \( p \) and \( q \) is jointly proportional to the charges and inversely proportional to the square of the distance, \( d \), between them. Which of the following equations, where \( k \) is a constant, represents this proportionality?
1. \( F = \frac{k(p + q)}{\sqrt{d}} \)

2. \( F = \frac{kpq}{\sqrt{d}} \)

3. \( F = \frac{kpq}{d^2} \)

4. \( F = \frac{kp}{qd^2} \)

5. \( F = \frac{kp}{q\sqrt{d}} \)

**Question 21–25**

These questions are based on the following figure.

The graph of \( f \) is a parabola with vertex \((1, 1)\) and \(x\)-intercepts at \(A\) and \(C\). It cuts the graph of \(g\), which is a straight line with \(y\)-intercept \(-3\), at the points \(E\) and \(C\). \(A\) and \(P\), and \(D\) and \(Q\), are points on the parabola and straight line respectively. They lie between the points of intersection of the graphs of \(f\) and \(g\). \(AD\) and \(PQ\) are parallel to the \(y\)-axis.

**Question 21 (Use sketch above)**

The equation of \(f\) is

1. \( y = -2x^2 - 4x - 3 \)
2. \( y = -4x^2 + 8x - 3 \)
3. \( y = -2x^2 + 4x + 1 \)
4. \( y = -4x^2 - 8x - 3 \)
5. \( y = -4x^2 - 8x + 5 \)
Question 22 (Use sketch on previous page)
The equation of \( g \) is

1. \( y - 2x + 3 = 0 \)
2. \( y - x + 3 = 0 \)
3. \( y - 6x + 3 = 0 \)
4. \( y + 6x + 3 = 0 \)
5. \( y + 2x - 3 = 0 \)

Question 23 (Use sketch on previous page)
\( f(x) - g(x) > 0 \) for all \( x \) values such that

1. \( x < 0 \) or \( x > \frac{3}{2} \)
2. \( x \leq 0 \) and \( x \geq \frac{3}{2} \)
3. \( 0 < x < \frac{3}{2} \)
4. \( x \geq 0 \) and \( x \leq \frac{3}{2} \)
5. \( -3 < x < 0 \)

Question 24 (Use sketch on previous page)
The length of \( AD \) is

1. 18 units
2. 2 units
3. 10 units
4. 0 units
5. \( 1\frac{1}{4} \) units

Question 25 (Use sketch on previous page)
The maximum length of \( PQ \) is

1. 2 units
2. \( 1\frac{1}{4} \) units
3. \( \frac{3}{4} \) units
4. \( \frac{5}{4} \) units
5. 10 units

TOTAL: [100]
A.5 Assignment 05

ASSIGNMENT 05
Study material: Book 3 (Topics 1–6)
Fixed closing date: 11 July 2017
Unique Assignment Number: 815883

• Make sure you make a copy of your assignment answer before you post it.
• Show all the steps of your working and give your reasons clearly. Give a proper conclusion to your answers where applicable.

Question 1
Suppose the functions $f$, $g$, $h$, $r$ and $\ell$ are defined as follows:

\[
\begin{align*}
  f(x) &= x(x + 1) \\
  g(x) &= \frac{1}{3}x + 2 \\
  h(x) &= 3\sqrt{x + 4} + x \\
  \ell(x) &= \frac{1}{\sqrt{1 - x}} \\
  r(x) &= \sqrt{(3x - 2)^2 + x}.
\end{align*}
\]

1.1 Write down $D_f$ and solve the inequality $f(x) > 6$. \(\text{(6)}\)
1.2 Write down $D_g$ and solve the equation $g(2x) = 0$. \(\text{(3)}\)
1.3 Write down $D_h$ and solve the equation $h(x) - 2x = 0$. \(\text{(7)}\)
1.4 Write down $D_{gr}$ and solve the equation $(gr)(x) = 0$. \(\text{(5)}\)
1.5 Write down $D_{h+\ell}$ without first calculating $(h + \ell)(x)$. \(\text{(2)}\)
1.6 Write down $D_{\frac{g}{f}}$ without first calculating $\left(\frac{g}{f}\right)(x)$. \(\text{(3)}\)
The sketch shows the graphs of functions $f$ and $g$. The graph of $f$ is a parabola defined by $y = ax^2 + bx + c$, such that the points $A$, $B$ and $C$ lie on $f$, and $D$ is its vertex. The graph of $g$ is a straight line defined by $y = mx + k$, such that the points $A$ and $D$ lie on the line. $f$ and $g$ intersect at the points $A$ and $D$.

2.1 (a) Calculate $a$, $b$ and $c$, and hence write down the equation of $f$. 
(b) Find the equation of the axis of symmetry of the parabola.

2.2 Find the equation of $g$.  

2.3 (a) Determine the equation of the line through $C$ which is perpendicular to the graph of $g$.
(b) Find the other point of intersection of the line in 2.3(a) and the parabola.

2.4 (a) Calculate the distance $d(A, D)$ between $A$ and $D$.
(Leave in surd form if necessary.)
(b) Write down the equation of the circle with centre $A$ and radius $d(A, D)$.

2.5 Find the equation of the hyperbola that passes through the midpoint of $AD$.  

2.6 Calculate the maximum vertical distance between the graphs of $f$ and $g$ between the points $A$ and $D$.  

2.7 Use the graphs to solve the inequality

$$ (f \cdot g)(x) \geq 0. $$

TOTAL: [50]
A.6 Assignment 06

ASSIGNMENT 06
Study material: Topic 7 of Book 3 & Book 4
Fixed closing date: 25 July 2017
Unique Assignment Number: 714554

Important:

• This is a multiple choice assignment which may be answered on a MARK READING SHEET and then posted to the university, or may be completed and submitted online using myUnisa. Before answering the assignment please read the instructions in the Unisa brochure: my STUDIES@Unisa, especially the section on completing and submitting mark-reading sheets and the section on submitting multiple-choice assignments via myUnisa.

• Always keep your rough detailed working so that you can compare your solutions with those that will be sent to you. Also keep a copy of your answers/options. You may need it later.

• 5 marks will be given for every correct answer.

• You may make use of a calculator in this assignment.

For Questions 1 to 4:
The following table lists the weights (in kilograms) of 80 newborn babies, each recorded to the nearest tenth of a kilogram.

| 4.9 | 3.2 | 4.7 | 2.6 | 2.4 | 4.4 | 3.2 | 4.8 |
| 3.8 | 3.5 | 3.3 | 3.0 | 3.9 | 3.8 | 3.4 | 3.3 |
| 2.9 | 3.5 | 3.4 | 4.2 | 3.4 | 2.9 | 3.4 | 3.5 |
| 4.3 | 4.9 | 1.9 | 3.7 | 3.6 | 4.3 | 4.9 | 1.9 |
| 5.1 | 3.7 | 2.8 | 2.3 | 3.8 | 5.1 | 3.7 | 2.8 |
| 4.7 | 3.9 | 4.4 | 2.9 | 4.3 | 4.7 | 3.9 | 4.4 |
| 2.8 | 3.7 | 3.3 | 2.2 | 3.9 | 3.3 | 3.7 | 2.8 |
| 4.4 | 4.7 | 3.0 | 2.9 | 3.7 | 4.4 | 4.7 | 3.0 |
| 3.6 | 5.2 | 4.7 | 3.7 | 4.4 | 3.6 | 5.3 | 4.2 |
| 5.2 | 3.9 | 2.5 | 2.3 | 4.0 | 5.2 | 3.9 | 2.5 |

Organise the raw data given above by means of a grouped frequency distribution with the following headings: classes, frequencies, class boundaries and class midpoints. Use a class width of 0.5 kg and a lowest class limit of 1.5 kg.

Question 1
Which of the following statements is/are true?

A. The grouped frequency distribution has 10 classes.
B. The difference between the highest weight and the lowest weight is 3.4 kg.
C. The class limits are extended to a second decimal place to create the class boundaries.
Question 2
Which of the following statements is/are true?

A. The class with class midpoint 4.7 kg has a frequency of 10.
B. The class with the lowest frequency has class limits of 1.5 kg and 1.9 kg.
C. The class boundaries of the class with the highest frequency are 4.95 kg and 5.45 kg.

1. Only A
2. Only B
3. Only C
4. Only A and B
5. Only B and C

Question 3
A histogram and a frequency polygon are drawn. Using the information in the grouped frequency distribution, which of the following statements is/are NOT true?

A. In the histogram the classes must always be represented on the horizontal axis.
B. The area of each of the rectangles of the histogram is equal to the frequency it represents.
C. In the frequency polygon, the height of each point corresponding to the class midpoint is proportional to the class frequency it represents.

1. Only A
2. Only B
3. Only C
4. Only A and B
5. Only B and C

Question 4
Suppose babies weighing 2.4 kg or less are classified as premature and babies weighing 4.5 kg or more are classified as exceptionally large. Babies weighing from 2.5 kg to 4.4 kg (inclusive) are classified as being of normal weight.

Which of the following pie graphs correctly represent(s) this information?

A. B. C.

1. Only A
2. Only B
3. Only C
4. Only A and C
5. A, B and C
For Questions 5 and 6:
In a survey to determine the (bad) smoking habits of first-year students, the number of cigarettes that they smoked each day was counted. The “back-to-back” stem-and-leaf plot below shows the data collected.

```
<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 1 3 1 0</td>
<td>8 0 5 0 2</td>
</tr>
<tr>
<td>2</td>
<td>4 6 2 5</td>
<td>5 6 2 0 4</td>
</tr>
<tr>
<td>3</td>
<td>6 2 0 4 6</td>
<td>3 5 7 3 0</td>
</tr>
<tr>
<td>4</td>
<td>9 3 4</td>
<td>1 6</td>
</tr>
<tr>
<td>5</td>
<td>0 1</td>
<td></td>
</tr>
</tbody>
</table>
```

Question 5
Which of the following statements is/are correct?

A. 20 students were questioned in the survey.
B. No man smoked less than 20 cigarettes each day.
C. The total number of cigarettes smoked each day by the women was less than the total number smoked each day by the men.

1. Only A
2. Only B
3. Only C
4. Only A and C
5. Only B and C

Question 6
Which of the following statement(s) is/are NOT correct?

A. The arithmetic mean of the number of cigarettes smoked each day by the women is 4 cigarettes less than the arithmetic mean of the number of cigarettes smoked each day by the whole group.
B. There is no mode.
C. The mean deviation of the number of cigarettes smoked each day by all the students in the group is 10 cigarettes.

1. Only A
2. Only B
3. Only C
4. Only B and C
5. A, B and C

Question 7
Which of the following statements is/are true?

A. If you are asked to draw a white ball from a bag of blue balls, the probability that a white ball will be drawn is 0.
B. If you are asked to draw a red ball from a bag of red balls, the probability that a red ball will be drawn is 1.
C. The probability that a prime number appears when rolling a die is \( \frac{3}{6} \), i.e. \( \frac{1}{2} \).

1. Only A
2. Only B
3. Only C
4. Only A and C
5. A, B and C
Question 8
A box contains 3 baseballs, 7 softballs and 11 tennis balls. Suppose \( P(\text{baseball}) \) denotes the probability of randomly selecting a baseball from the box.
Which of the following statements is/are true?

A. The probability that a ball selected at random will not be a tennis ball is
   \[ 1 - P(\text{tennis ball}) = 1 - \frac{11}{21} = \frac{10}{21}. \]
B. The probability that a ball selected at random will be a baseball or a softball is
   \[ \frac{3}{21} \times \frac{7}{21} = \frac{1}{21}. \]
C. Suppose one tennis ball is taken out, and another ball is then randomly selected.
   The probability that it will be a softball is \( \frac{7}{20} \).


Question 9
How many axes of symmetry does this shape have?

![Shape with 3 axes of symmetry]

1. 0 2. 1 3. 2 4. 3 5. 6

Question 10
A square and an equilateral triangle have equal perimeters. Each side of the triangle is 3 cm longer than each side of the square. How long is each side of the square?

1. 3 cm 2. 6 cm 3. 9 cm 4. 12 cm 5. 15 cm

Question 11
In a rectangle each diagonal divides the rectangle into two triangles.
Which of the following statements is/are true?

The two triangles are:
A. Congruent
B. Similar
C. Scalene


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Question 12

In \( \triangle ABC \) the lines \( BQ \) and \( CR \) are perpendicular to \( AC \) and \( AB \) respectively. If \( B\hat{P}C = 100^\circ \), then the size of \( \hat{A} \) will be:

1. 40\(^\circ\)   2. 80\(^\circ\)   3. 120\(^\circ\)   4. 130\(^\circ\)   5. 160\(^\circ\)

Question 13

Consider the following sketch:

The sum of the measures of the numbered angles is:

1. 540\(^\circ\)   2. 360\(^\circ\)   3. 180\(^\circ\)   4. 90\(^\circ\)   5. 45\(^\circ\)

Question 14

Consider the following triangle:
Which of the following statements is/are true?

A. $\triangle ABC$ is isosceles.
B. The value of $x + y$ is $85^\circ$.
C. The size of $A\hat{D}C$ is $85^\circ$.

1. Only A  2. Only B  3. Only C
4. Only B and C  5. A, B and C

**Question 15**
Consider the following sketch, in which $\triangle PQR$ is a right triangle with $PR \neq QR$.

Which of the following statements is/are true?

A. $DE \parallel AB \parallel PR$
B. $\triangle DQE \parallel \parallel \triangle AQB \parallel \parallel \triangle PQR$
C. $\hat{P} = \hat{A}_1 = \hat{D}_1 = 60^\circ$

1. Only A  2. Only B  3. Only C
4. Only A and B  5. A, B and C

**Question 16**

The values of $x$ and $y$ are

1. $x = 150^\circ$, $y = 142^\circ$  
2. $x = 75^\circ$, $y = 71^\circ$  
3. $x = 112^\circ$, $y = 142^\circ$  
4. $x = 68^\circ$, $y = 38^\circ$  
5. $x = 112^\circ$, $y = 38^\circ$
Questions 17 and 18 are based on the following figure.
The figure represents a rectangular prism with base $HABC$.

**Question 17**
Which of the following statements is/are true?

A. $AC$ is the diagonal of rectangle $HABC$.
B. The length of $AC$ is 26 cm.
C. $EB$ is the hypotenuse of right triangle $EBH$.

1. Only A  
2. Only B  
3. Only C  
4. Only A and C  
5. A, B and C

**Question 18**
Which of the following statements is/are true?

A. The volume of the prism is 1 920 cm$^3$.
B. The area of $HABC$ (the base of the prism) is 240 cm$^2$.
C. The total surface area is 512 cm$^2$.

1. Only A  
2. Only B  
3. Only C  
4. Only A and B  
5. Only B and C

**Question 19**
A cardboard box with dimensions 40 cm, 32 cm and 24 cm is shown below.
A jam tin has a diameter of 8 cm and a height of 12 cm. The maximum number of jam tins that can be placed in this cardboard box is:

1. 18 tins  2. 20 tins  3. 40 tins  4. 42 tins  5. 46 tins

**Question 20**
Consider the sketch below. A semi-circle with centre $M$ and diameter $BC = 18\, cm$ is drawn inside rectangle $ABCD$. $EADF$ is a trapezoid (trapezium).

Use a calculator and round answers to one decimal place if necessary.
Which of the following statements is/are true?

A. Area of semi-circle with centre $M$ is $127.2\, cm^2$ (correct to one decimal place).
B. Area of trapezium $EADF$ is $45\, cm^2$.
C. Area of shaded region is $133.8\, cm^2$.


**TOTAL: [100]**
A.7 Assignment 07

Note: This assignment consists of the October/November 2016 exam paper. The questions will be sent to you in a separate tutorial letter.

Please look out for it!

TOTAL: [100]