Tutorial Letter 101/3/2017

Elementary Quantitative Methods

QMI1500

Semesters 1 and 2

Department of Decision Sciences

This tutorial letter contains important information about your module.

Bar code

Contents

1 INTRODUCTION AND WELCOME

Dear Student

We are pleased to welcome you to the module QMI1500 and hope that you will find it both interesting and rewarding. We shall do our best to make your study of this module successful. You will be well on your way to success if you start studying early in the semester and resolve to do the assignments properly.

In this module you will learn useful mathematical skills that will enable you to solve practical problems. You will learn how beautiful and elegant numbers can be and what fun it is to work with them. So if you are frightened of numbers, this module is going to help you get rid of your fears. It will, however, not happen overnight - one has to work hard and do lots of exercises to master mathematics.

Learning to do mathematics is like building a wall - one brick fits on top of the other. So make sure that you are familiar with one section of the work before moving on to the next. We hope that we will enjoy a happy and successful semester together.

2 SYLLABUS: PURPOSE AND OUTCOMES

2.1 Purpose

The purpose of this module is to introduce the student to elementary mathematical modelling, elementary descriptive statistics, index numbers and financial mathematics.

2.2 Outcomes

2.2.1 *Learning Outcomes 1: Numbers and Working with Numbers*

Students can demonstrate an understanding of numbers and working with numbers.

Assessment criteria:

(a) Know and apply the priority rules, laws of operations, basic signs and notations and counting rules in solving problems.

(b) Express relationships between numbers by using symbols.

(c) Do basic mathematical operations on fractions.

(d) Solve problems containing roots and/or powers.

(e) Relate numbers to each other using ratios, proportions and percentages.

(f) Convert units and measures of length, distance, area and volume.

2.2.2 *Learning Outcome 2: Collection, presentation and description of data*

Students can apply the basic techniques of descriptive statistics to a small data set.

Assessment criteria:

(a) Explain a few simple sampling techniques.

(b) Represent the data graphically using histograms, pie charts, cumulative frequency polygons and stem-and-leaf diagrams.

(c) Distinguish between qualitative and quantitative data.

(d) Set up a frequency table.

(e) Calculate the mean, the mode and the median of a data set.

(f) Calculate the variance, standard deviation, quartile deviation and coefficient of variation of an unordered data set.

(g) Calculate the variance and standard deviation of a data set ordered in intervals.

(h) Draw and interpret a box-and-whiskers diagram of an unordered data set.

2.2.3 *Learning Outcome 3: Index numbers and transformations*

Students can calculate simple index numbers and perform transformations.

Assessment criteria:

(a) Calculate quantity, value and price indices.

(b) Calculate the purchasing power of money in a specific period.

(c) Calculate an exchange rate.

(d) Do transformations and calculations with a fine ounce of gold.

(e) Calculate a growth rate.

2.2.4 *Learning Outcome 4: Functions and representations of functions*

Students can apply mathematical concepts to do basic modelling.

Assessment criteria:

(a) Explain the concept of a function.

(b) Differentiate between linear, quadratic, exponential and logarithmic functions.

(c) Explain the different characteristics of linear and quadratic functions.

(d) Represent linear and quadratic functions graphically.

2.2.5 *Learning Outcome 5: Linear systems*

Students can apply mathematical concepts to solve linear inequalities in one or two variables.

Assessment criteria:

(a) Solve linear inequalities and linear equations in one or two variables algebraically.

(b) Solve a system of linear inequalities in one or two variables graphically.

2.2.6 *Learning Outcome 6: An application of differentiation*

Students can apply elementary differentiation rules.

Assessment criteria:

(a) Calculate and interpret the marginal profit at a specific production level.

(b) Calculate and interpret the marginal cost at a specific production level.

2.2.7 *Learning Outcome 7: Mathematics of Finance*

Students can apply the basic concepts of financial mathematics to solve elementary practical financial problems.

Assessment criteria:

(a) Calculate simple interest, simple discount and compound interest.

(b) Give and apply the equations and the corresponding time lines relating present and future values of money when compounding is applicable.

(c) State and apply the two rules for moving money backward and forward in time.

(d) Use the rules to replace one set of financial obligations with another, that is, reschedule debts.

(e) Explain the basic structure and elements of an annuity.

(f) Determine the present value and future value of an annuity.

(g) Calculate the payments on a mortgage loan.

(h) Set up an amortisation schedule for a loan.

(i) Reschedule payments on a loan for changes in interest rate or term.

(j) Manipulate the formula in order to obtain expressions for the specific variables.

3 LECTURER(S) AND CONTACT DETAILS

3.1 Lecturer(s)

The lecturer(s) for QMI1500 will assist you if you experience any difficulties regarding the study material. Do not hesitate to contact them, but please make an appointment if you want to see them personally.

Information on your lecturer(s) is available in Tutorial letter 301, 2016. (You should have received this tutorial letter together with this one.) To ensure that you have your lecturer's contact details readily available, transfer it to the box below.

All queries about the content of this module should be directed to us. Please have your study material with you when you contact us.

3.2 Department

If you need assistance regarding the study material and cannot reach your lecturer, you may contact one of the secretaries in the department, at:

Telephone: 012 433-4684
012 433-4722
012 433-4654
E-mail: qm@unisa.ac.za

3.3 University and College

If you need to contact the University about matters not related to the content of this module, please consult my studies @ Unisa. This brochure contains contact information regarding different administrative matters, including important telephone and fax numbers, addresses and office hours of certain facilities.

For college related queries, you can contact Ms Portia Ngcobo, the Information Coordinator of the College of Economic Sciences at:

Telephone: 012 429-3925
E-mail: CEMSenquiries@unisa.ac.za

Always have your student number at hand when you contact the University.

4 RESOURCES

4.1 Library services and resources information

For brief information, go to www.unisa.ac.za/brochures/studies

For detailed information, go to the Unisa website at http://www.unisa.ac.za/ and click on Library.

For research support and services of personal librarians, go to
http://www.unisa.ac.za/Default.asp?Cmd=ViewContent&ContentID=7102.

The library has compiled a number of library guides:

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

- requesting 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; finding us on social media; frequently asked questions - http://libguides.unisa.ac.za/ask

5 STUDENT SUPPORT SERVICES

5.1 Face-To-Face Tutors

Face-to-face tutoring involves face-to-face **contact sessions between the students and the tutor**, that means students meet with their tutors in a classroom setup, at designated venues and at specific times at the **Unisa Regional Learning Centres**. Face-to-face tutors are qualified experts who are practitioners and specialists in the subjects in which they are appointed to be face-to-face tutors.

To join face-to-face tutorials you need to go to the Unisa Regional Learning Centre nearest to you to enroll for tutorials. The regional offices will supply you with the dates, place and times of the sessions for the modules you had enrolled for. Note that not all Regional offices present tutor classes.

5.2 E-tutors

E-tutoring entails the delivery of **teaching and learning online via the internet**. An e-tutor is the person who undertakes the role to support and enable students to learn online effectively. E-tutors are qualified experts who are practitioners and specialists in the subjects in which they are appointed to be e-tutors.

E-tutors will be group to students after the registration process has ended. Students will receive a system generated mylife e-mail notification, informing them that they are allocated to an e-tutor. To access your tutor, log on to myUnisa you will have an additional module tab with the module code. Once you have opened the additional module tab you can start communicating with your e-tutor through the discussion forum or other communication tools available on the group site as prescribed.

6 STUDY PLAN

There are about four months of study time in a semester. In this short period of time you have to work through the study material, do the assignments and prepare yourself for the examination. You will therefore have to plan carefully.

Since this module is of a mathematical nature you will need to work consistently throughout the semester to master it. We suggest that you spend at least 45 minutes per day on this module.

6.1 Study Material

The study material consists of seven topics that are contained in MO001 that you should have received with registration. The following table shows the topics in MO001:

Chapter	Topic
1	Numbers and working with numbers
2	Collection, presentation and description of data
3	Index numbers and transformations
4	Functions and representations of functions
5	Linear systems
6	An application of differentiation
7	Mathematics of finance

You might find some topics easier than others and will need less time to master it. It is therefore not possible to set a restriction on the time you should spend on each topic. It would, however, be wise not to spend more than two weeks on a topic.

Start your studies as soon as possible to enable yourself to cover the module and have enough time to study for the examination.

To help you master the work in this module, we supply you with additional exercises in the form of *self-evaluation exercises* and a *workbook*.

6.2 Self-evaluation Exercises

Self-evaluation exercises are intended to serve as a test of your ability to answer questions similar to those you can expect in the assignments and examination.

When you feel that you have a complete understanding of a certain topic, attempt the self-evaluation exercise on it.

After completing a self-evaluation exercise (without looking at the solutions, available in Tutorial Letter 103), evaluate your own work by comparing your answers with the solutions that are provided.

The solutions often contain helpful explanations and remarks that you will only take note of during the self-evaluation process.

6.3 Workbook

The MO002 document that you can download from myUnisa is a workbook containing additional exercises on each topic.

Do as many of the exercises in the workbook as possible. This will help you to master the topics sufficiently and complete the module successfully.

6.4 Study Method

Buy a calculator as soon as possible and make sure you know how it works before you start with your studies. See the notes on using the recommended calculator in Tutorial letter 102.

We suggest that you start with Topic 1 in MO001. Work through each study unit and do the activities and exercises. Check your answers against the answers that are supplied.

When you have mastered the work and you can successfully do all activities and exercises, do the self-evaluation exercises and evaluate your progress.

The workbook provides extra exercises on every study unit. If you feel you need more practice on a certain part of the work, do these exercises. Complete and submit the assignment (before its due date) when you have covered its relevant topics.

7 ASSESSMENT

7.1 Assignments

Assignments are an integral part of the learning material for this module. There are three compulsory assignments per semester.

Note the following:

(a) All three assignments are compulsory.

(b) You must submit the compulsory assignments to be allowed to write examination at the end of the semester.

(c) All assignment marks count toward your semester mark which counts 20% of your final mark for the module.

(d) All assignments consist of multiple-choice questions and must be completed on myUnisa. NO manual or posted submissions will be allowed.

(e) Ensure that your assignments are submitted by the due dates. Late submissions will not be accepted.

(f) To find out whether the University has received your assignment, go to myUnisa. (Your lecturer will not be able to give you this information.)

The following table shows for each assignment the due date, unique number, topic(s) it covers and its contribution to the semester mark (weight):

Assignment	**Due dates and unique numbers**				**Topic(s)**	**Weight**
	First semester		**Second semester**			
01	17 February	678389	04 August	767179	1, 2, 3	30%
02	17 March	787125	25 August	753582	4, 5, 6	35%
03	19 April	785589	18 September	743987	7	35%

7.1.1 *Submission of assignments*

To complete and submit an assignment via myUnisa, do the following:

- Log into myUnisa with your student number and password.
- Select the module (QMI1500).
- Click on Assessment info in the menu on the left.
- Click on the assignment number you want to submit.
- Follow the instructions on the screen.

7.1.2 *Feedback on Assignments*

You will receive the correct options for the multiple-choice questions automatically. These will also be available on myUnisa.

A tutorial letter containing solutions to each assignment will be posted on myUnisa after the due date.

Please check your answers after you have received the feedback. This is an important part of your learning experience and should help you to be better prepared for the next assignment and the examination.

7.2 Examinations

General guidelines for the examination, as well as guidelines for the preparation of the examination can be found in my Studies @ Unisa.

Also note the following:

- The Directorate: Student Assessment Administration will provide you with information regarding examination venues, examination dates and examination times.
- You will write a two-hour examination paper consisting of multiple-choice questions only.
- The paper must be answered on a mark-reading sheet with an HB pencil.
- A list of formulæ will be attached to the examination paper.
- Only your calculator, pen(s) and an HB pencil may be taken into the examination hall.
- The examination will cover all the study material.
- The use of a programmable calculator is permitted in the examination.
- The semester mark will contribute 20% towards your final mark, while the examination will contribute 80%.
- A subminimum of 40% applies to the examination. This means that if your examination mark is less than 40%, your semester mark will not be taken into account for your final mark. Your examination mark will then be your final mark.

8 FREQUENTLY ASKED QUESTIONS

For general questions, see my Studies @ Unisa.

The following are a few questions that are regularly asked:

1. Can I have the memoranda of the examination papers that are available on myUnisa? The memoranda are not given out. If you do the papers and you send your workings to your lecturer, he/she will return it to you with feedback.
2. I already have another calculator. Do I still have to buy the SHARP EL-738?

You may use any other financial calculator, but assistance will only be given for the SHARP EL-738.

9 ASSIGNMENTS: FIRST SEMESTER

9.1 Assignment 01 (Compulsory)

Due Date	Unique Number
17 February 2017	678389

Only students who are registered for the first semester should complete and submit this assignment.

Answer the questions online through myUnisa. Follow the instructions carefully. No extension will be granted for submission of this assignment. ***NO*** *manual or posted submissions will be allowed.*

Question 1

Simplify:

$$\frac{x^{\frac{2}{3}} \times x^{\frac{2}{5}}}{x^{\frac{-2}{4}}}$$

[1] $x^{1\frac{17}{20}}$

[2] $x^{\frac{17}{30}}$

[3] $x^{\frac{22}{30}}$

[4] $x^{3\frac{2}{30}}$

[5] None of the above.

Question 2

8 workers can paint a building in 24 days. How many days will 18 workers take to paint the same building?

[1] 6 days

[2] $10\frac{2}{3}$ days

[3] 54 days

[4] $2\frac{1}{4}$ days

[5] None of the above.

Question 3

A take-away has a 4-piece lunch special which consists of a sandwich, soup, dessert and drink for R25,00. They offer the following choices for : Sandwich: chicken mayonnaise, cheese and tomato, tuna, and ham and lettuce Soup: tomato, chicken noodle, vegetable Dessert: ice-cream, piece of cake Drink: tea, coffee, coke, Fanta and Sprite. How many possible meals are there?

[1] 60

[2] 24

[3] 120

[4] 40

[5] None of the above.

Question 4

During a national television advertising campaign, Perfect Pizza stated that for \$9.95, you could get 2 medium-sized pizzas, each with any of 0 to 5 toppings chosen from 11 that are available. The commercial asked the question, "How many different pairs of pizzas can you get?" Answer the question, if the first pizza has a thin crust and the second has a thick crust.

[1] 10 465 29

[2] 2 046

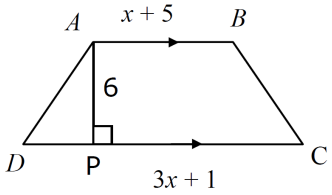
[3] 1 023

[4] 10 485 76

[5] None of the above.

Question 5

In the figure below, AB $= (x + 5)$ cm, CD $= (3x + 1)$ cm, PA $= 6$ cm, and AB is parallel to CD. If the area is 66 cm^2, find x.



[1] $x = 8$

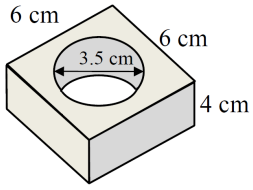
[2] $x = 4$

[3] $x = 6$

[4] $x = 2$

[5] none of the above

Question 6



A hole with a diameter of 3.5 cm is drilled through a square metal nut of thickness 4cm and length 6cm. What is the surface area?

[1] 168 cm^2
[2] 134,75 cm^2
[3] 202,75 cm^2
[4] 192,75 cm^2
[5] None of the above.

Question 7

Assume that in a dataset of 50 observations the largest value is 180 and the smallest value is 68. If there are 8 classes; the width of the class intervals is:

[1] 14
[2] 16
[3] 18
[4] 8
[5] None of the above.

Questions 8 to 13 are based on the following situation:
Consider the data 10, 12, 12, 8, 30, 12, 8, 10, 5, 23.

Question 8

Find the mode.

[1] 13
[2] 12
[3] 11
[4] 14
[5] None of the above.

Question 9

Find the mean.

[1] 11
[2] 14
[3] 13
[4] 12
[5] None of the above.

Question 10

Find the median.

[1] 14
[2] 11
[3] 12
[4] 13
[5] None of the above.

Question 11

What is the variance of the sample dataset?

[1] 22,76
[2] 90,34
[3] 58,22
[4] 8,52
[5] None of the above.

Question 12

Find the standard deviation.

[1] 4,77
[2] 9,51
[3] 7,63
[4] 2,91
[5] None of the above.

Question 13

Find the coefficient of variation.

[1] 0,58
[2] 0,76
[3] 0,29
[4] 0,47
[5] None of the above.

Question 14

The standard deviation of a dataset is used to find:

[1] The dispersion around the median

[2] The dispersion around the mean

[3] The relative variability between datasets

[4] The average of the dataset

[5] None of the above.

Question 16 and 17 are based on the following information:
The prices for the six food items are given in the table below. Also included is the number of units of each consumed by a typical family in 1995 and 2005.

	1995		2005	
Item	Price ($)	Quantity	Price ($)	Quantity
Bread white (loaf)	0.77	50	1.98	55
Eggs (dozen)	1.85	26	2.98	20
Milk (litre) white	0.88	102	1.98	130
Apples, red delicious (500 g)	1.46	30	1.75	40
Orange juice, (355 ml concentrate)	1.58	40	1.70	41
Coffee, 100% ground roast (400 g)	4.40	12	4.75	12

Question 15

Determine a weighted price index using the Laspeyres method.

[1] 185,8

[2] 180,8

[3] 165,4

[4] 168,4

[5] None of the above.

Question 16

Determine the Paasche Price index.

[1] 185,8

[2] 180,8

[3] 165,4

[4] 168,4

[5] None of the above.

Question 17

The prices and quantities sold at the Waleska Department Store for various items of apparel for May 2000 and May 2005 are:

Item	2000 Price, p_0 ($)	2000 Quantity Sold (thousands), q_0	2005 Price, p_t ($)	2005 Quantity Sold (thousands), q_t
Ties (each)	10	1000	12	900
Suits (each)	300	100	400	120
Shoes (pair)	100	500	120	500

What is the index of value for May 2005 using May 2000 as the base period?

[1] 123,0

[2] 135,0

[3] 128,0

[4] 132,0

[5] None of the above.

Questions 18 and 19 are based on the following information:
The take-home pay of Josh Raymond's and the CPI for 1998 and 2003 are:

Year	Take-Home Pay ($)	CPI (1992 = 100)
1998	25 000	107.6
2003	412 00	119.0

Question 18

What was Josh's real income in 1998?

[1] $21 008,40

[2] $25 000,00

[3] $23 234,20

[4] $22 605,04

[5] None of the above.

Question 19

What was his real income in 2003?

[1] $38 289,96

[2] $41 200,00

[3] $34 621,85

[4] $37 253,10

[5] None of the above.

Question 20

A certain point in time the South African Rand (R) is converted to the American Dollar ($) at a rate of $1.00 = R6.50 If an article costs $15 in the USA the number of articles that can be bought for R2 535 is:

[1] 168

[2] 97

[3] 390

[4] 26

[5] None of the above.

9.2 Assignment 02 (Compulsory)

Due Date	Unique Number
17 March 2017	787125

Only students who are registered for the first semester should complete and submit this assignment.

Answer the questions online through myUnisa. Follow the instructions carefully. No extension will be granted for submission of this assignment. ***NO*** *manual or posted submissions will be allowed.*

Question 1

RSA Census Bureau data indicate that the average price p of color television sets can be expressed as a linear function of the number of sets sold N (in thousands). In addition, as N increased by 1 000, p dropped by R10.40 and when 6 485 (thousand) sets were sold, the average price per set was R504.39.
Write the equation of the line determined by this information?

[1] $p = -0.0104 + 571.834$

[2] $p = 0.0104 - 571.834$

[3] $p = 96.153 + 571.834$

[4] $p = -96.,153 - 571.834$

[5] None of the above.

Question 2

Residential customers who heat their homes with natural gas have their monthly bills calculated by adding a base service charge of R5.19 per month and an energy charge of 51.91 cents per hundred m^3. Write an equation for the monthly charge y in terms of x, the number of hundreds of m^3 used.

[1] $y = 0.5191x + 5.19$

[2] $y = 0.5191x + 519$

[3] $y = 51.91x + 5.19$

[4] $y = 0.519x + 51.91$

[5] None of the above.

Questions 3 and 4 are based on the following information:
Given the function $y = 4x - x^2$

Question 3

Determine the vertex of the function.

[1] $(4; 0)$

[2] $(2; 0)$

[3] $(2; 4)$

[4] $(4; 2)$

[5] None of the above

Question 4

Determine the intercepts of the function.

[1] (4; 0) and (2; 0)
[2] (4; 0) and (0; 0)
[3] $(-2; 0)$ and (0; 0)
[4] (2; 0) and (0; 0)
[5] None of the above.

Questions 5 and 6 refer to the following information:
Ace Cruise Line offers an inland waterway cruise to a group of 50 people for a price of R30 per person, but it reduces the price per person by R0,50 for each additional person above the 50.

Question 5

How many people will provide maximum revenue for the cruise line?

[1] 105 people
[2] 60 people
[3] 55 people
[4] 75 people
[5] None of the above.

Question 6

What is the average rate of change if the group increases from 50 to 55 people?

[1] R1 per person
[2] R2.50 per person
[3] R5 per person
[4] R15 per person
[5] None of the above.

Questions 7 and 8 are based on the following information:
If R10 000 is invested at 6%, compounded monthly, then the future value of the investment S after x years is given by $S = 10\,000(1.005)^{12x}$)

Question 7

Find the value of the investment after 5 years.

[1] R10 252,51
[2] R13 000,00
[3] R13 488,50
[4] R14 185,19
[5] None of the above.

Question 8

Find the value of the investment after 30 years.

[1] R11 614.00

[2] R28 000.00

[3] R53 502.50

[4] R60 225.,75

[5] None of the above.

Question 9

For boys between 4 and 16 years of age, height and age are linearly related. That relation can be expressed as $H = 2.31A + 31.26$ where H is the height in inches and A is age in years. To account for natural variation among individuals, normal is considered to be any measure falling within 5% of the height obtained from the equation. Write as an inequality the range of normal height for a boy who is 9 years old.

[1] $49{,}45 \leq H \leq 52.05$

[2] $49{,}45 \leq H \leq 54.65$

[3] $49{,}45 \leq H \leq 54.65$

[4] $52{,}05 \leq H \leq 54.65$

[5] None of the above.

Question 10

A person has R200,000 invested, part at 9% and part at 8%. If the total yearly income from the two investments is R17 200, how much is invested at 9% and how much at 8%?

[1] 40 000 at 9% and 160 000 at 8%

[2] 40 000 at 8% and 160 000 at 9%

[3] 80 000 at 9% and 120 000 at 8%

[4] 80 000 at 8% and 120 000 at 9%

[5] None of the above.

Question 11

Suppose that a firm manufactures MP3 players and sells them for R50 each. The costs incurred in the production and sale of the MP3 players are R200,000 plus R10 for each player produced and sold. Write the profit function for the production and sale of x players.

[1] $P(x) = 50x$

[2] $P(x) = 40x - 200\,000$

[3] $P(x) = 200\,000 - 10x$

[4] $P(x) = 200\,000 - 40x$

[5] None of the above.

Question 12

Solve for the following equations:

$$\begin{cases} 3x - 4y = -24 \\ x + y = -1 \end{cases}$$

[1] $x = 6$ and $y = -7$

[2] $x = -4$ and $y = 3$

[3] $x = 20$ and $y = -21$

[4] $x = -8$ and $y = 7$

[5] None of the above.

Question 13

When solving the following inequality: $-5x + 3 \geq x - 15$, the solution to one decimal place is

[1] $x \geq 2{,}0$

[2] $x \leq 4{,}5$

[3] $x \leq 3{,}0$

[4] $x \geq 5{,}0$

[5] None of the above.

Questions 14 to 16 are based on the information below:
A farm has 6 000 acres available to plant with corn and soybeans. Each acre of corn requires 9 litres of fertiliser/herbicide and hour of labour to harvest. Each hectare of soybeans requires 3 litres of fertiliser/herbicide and 1 hour of labour to harvest. The co-op has available at most 40 500 gallons of fertiliser/herbicide and at most 5 250 hours of labour for harvesting. The number of hectares of each crop is limited (constrained) by the available resources: land, fertiliser/herbicide, and labour for harvesting. Let x represent the number of hectares of corn and y represent the number of hectares of soybeans.

Question 14

Write the system of inequalities that describes the farm's constraints.

[1] $x + y \leq 5\,250;\ 9x + 3y \leq 40\,500;\ \frac{3}{4}x + y \leq 6\,000$

[2] $x + y \leq 5\,250;\ 9x + 3y \leq 40\,500;\ \frac{3}{4}y + x \leq 6\,000$

[3] $x + y \leq 6\,000;\ 9x + 3y \leq 40\,500;\ \frac{3}{4}x + y \leq 5\,250$

[4] $x + y \leq 6\,000;\ 9x + 3y \leq 40\,500;\ \frac{3}{4}x + y \leq 5\,250$

[5] None of the above.

Question 15

What is the most number of acres of corn and of soybeans that the farm could plant, treat with fertiliser/herbicide, and harvest. (Tip: Solve the system of inequalities and identify the extreme point(s) of the region of solution).

[1] (3000; 3750) and (2250; 3000)

[2] (3750; 3000) and (3000; 2250)

[3] (2250; 3750) and (3000; 3000)

[4] (3750; 2250) and (3000; 3000)

[5] None of the above.

Question 16

If the profits per hectare are R60 for corn and R40 for soybeans, how many hectares of each crop should they plant in order to maximise their profit? What is the maximum profit?

[1] R285 000

[2] R300 000

[3] R315 000

[4] R330 000

[5] None of the above.

Questions 17 and 18 are based on the information below:
If the total profit, in thousands of dollars, for a product is given by $P(x) = 20\sqrt{x+1} - 2x$.

Question 17

Define the marginal profit function?

[1] $20\sqrt{x+1} - 2$

[2] $10\sqrt{x+1} - 2$

[3] $\frac{20}{\sqrt{x+1}} - 2$

[4] $\frac{10}{\sqrt{x+1}} - 2$

[5] None of the above.

Question 18

What is the marginal profit at a production level of 15 units?

[1] R0.50 per unit

[2] R3 per unit

[3] R38 per unit

[4] R78 per unit

[5] None of the above.

Questions 19 and 20 are based on the information below:
Suppose the total cost function for a commodity is $C(x) = 0.01x^3 - 0.9x^2 + 33x + 3\,000$.

Question 19

Define the marginal cost function.

[1] $0.03x^2 + 1.8x + 33$
[2] $0.01x^2 - 0.9x + 33$
[3] $0.03x^2 - 1.8x + 33$
[4] $0.02x^2 + 0.9x + 33$
[5] None of the above.

Question 20

What is the marginal cost if 50 units are produced?

[1] R13 per unit
[2] R18 per unit
[3] R128 per unit
[4] R198 per unit
[5] None of the above.

9.3 Assignment 03 (Compulsory)

Due Date	Unique Number
19 April 2017	785589

Only students who are registered for the first semester should complete and submit this assignment.

Answer the questions online through myUnisa. Follow the instructions carefully. No extension will be granted for submission of this assignment. ***NO*** *manual or posted submissions will be allowed.*

Question 1

If R4 000 is borrowed for 39 weeks at an annual interest rate of 15%, how much interest is due at the end of the 39 weeks?

[1] R450

[2] R5 250

[3] R487.50

[4] R5287.50

[5] None of the above.

Question 2

An investor wants to have R20,000 in 9 months. If the best available interest rate is 6.05% per year, how much must be invested now to yield the desired amount?

[1] R13 757.52

[2] R19 131.89

[3] R12 461.06

[4] R18 859.03

[5] None of the above.

Question 3

If R1000 is invested at 5,8% simple interest, how long will it take to grow to R1 100?

[1] 0.172 years

[2] 0.58 years

[3] 1.58 years

[4] 1.724 years

[5] None of the above.

Question 4

If a R2500 investment grows to R2875 in 15 months, what simple interest rate was earned?

[1] 9.60%
[2] 12.00%
[3] 15.00%
[4] 18.75%
[5] None of the above.

Question 5

Find the future value if R1 000 if invested for 20 years at 8%, compounded continuously.

[1] R4953.03
[2] R4926.80
[3] R4953.08
[4] R4952.99
[5] None of the above.

Question 6

How long does it take R5000 to double if it is invested at 9% compounded monthly?

[1] 160 months
[2] 92.8 months
[3] 133.3 months
[4] 111.1 months
[5] None

Question 7

How long does it take an investment of R10 000 to double if it is invested at 8%, compounded annually?

[1] 8.66 years
[2] 8.69 years
[3] 8.83 years
[4] 9.00 years
[5] None of the above.

Question 8

Abby invests R2 000 at the end of each year for 36 years (until age 65) in an account that pays 10%, compounded annually. How much does Abby have at age 65?

[1] R598 254.00
[2] R618 253.00
[3] R721 127.0
[4] R731 604.0
[5] None of the above.

Question 9

Suppose a company wants to have R450 000 after 2.5 years to modernise its production equipment. How much of each previous quarter's profits should be deposited at the beginning of the current quarter to reach this goal, if the company's investment earns 6,8%, compounded quarterly?

[1] R25 958.31
[2] R38 019.20
[3] R40 967.39
[4] R41 663.84
[5] None of the above.

Question 10

What is the present value of an annuity of R1 500 payable at the end of each 6-month period for 2 years if money is worth 8%, compounded semi-annually?

[1] R3 509.58
[2] R5 444.84
[3] R6 369.70
[4] R6 960.00
[5] none of the above

Question 11

Suppose that a couple plans to set up an ordinary annuity with a R100 000 inheritance they received. What is the size of the quarterly payments they will receive for the next 6 years (while their children are in college) if the account pays 7%, compounded quarterly?

[1] R5 138.57
[2] R8 718.90
[3] R11 988.30
[4] R17 702.26
[5] None of the above.

Question 12

An inheritance of R400 000 will provide how much at the end of each year for the next 20 years, if money is worth 7%, compounded annually?

[1] R18 691.59
[2] R19 884.01
[3] R37 214.35
[4] R37 757.17
[5] None of the above.

Question 13

An inheritance of R400 000 will provide how much at the end of each year for the next 20 years, if money is worth 7%, compounded annually?

[1] R9 214.34
[2] R9 757.19
[3] R37 214.34
[4] R37 757.17
[5] None of the above.

Question 14

A debt of R1 000 with interest at 16%, compounded quarterly, is to be amortized by 20 quarterly payments (all the same size) over the next 5 years. What will the size of these payments be?

[1] R42.17
[2] R56.16
[3] R73.58
[4] R97.24
[5] None of the above.

Question 15

Find the amount of each payment if a debt of R25 000 is to be amortised with equal quarterly payments over 6 years, and money is worth 7%, compounded quarterly.

[1] R1 284.64
[2] R1 106.47
[3] R1 089.86
[4] R1 196.42
[5] None of the above.

Question 16

A 42-month loan to pay your car has monthly payments of R411.35. If the interest rate is 8,1%, compounded monthly, find the unpaid balance immediately after the 24th payment.

[1] R4 295.12
[2] R6 950.13
[3] R3 828.53
[4] R9 086.01
[5] None of the above.

Question 17

A small business invests R1 000 at the end of each month in an account that earns 6% compounded monthly. How long will it take until the business has R100 000 toward the purchase of its own office building?

[1] 79 months
[2] 82 months
[3] 401 months
[4] 924 months
[5] None of the above.

Questions 18 to 20 are based on the information below:
A man buys a house for R200 000. He makes a R50 000 down payment and agrees to amortise the rest of the debt with quarterly payments over the next 10 years. Interest on the debt is 12%, compounded quarterly.

Question 18

What is the size of the quarterly payments?

[1] R6 489.36
[2] R6 636.91
[3] R8 652.48
[4] R8 849.21
[5] None of the above.

Question 19

What is the total amount of the payments?

[1] R346 099.20
[2] R265 476.40
[3] R259 574.40
[4] R353 968.40
[5] None of the above.

Question 20

What is the total amount of interest paid?

[1] R146 099.20

[2] R109 574.40

[3] R153 964.40

[4] R115 476.40

[5] None of the above.

10 ASSIGNMENTS: SECOND SEMESTER

10.1 Assignment 01 (Compulsory)

Due Date	Unique Number
04 August 2017	767179

Only students who are registered for the second semester should complete and submit this assignment.

Answer the questions online through myUnisa. Follow the instructions carefully. No extension will be granted for submission of this assignment. ***NO*** *manual or posted submissions will be allowed.*

Question 1

The expression: $x_1^2 f(x_1) + x_2^2 f(x_2) + x_3^2 f(x_3) + x_4^2 f(x_4) + x_5^2 f(x_5)$ can be written as a summation notation as:

[1] $\sum_{i=1}^{5} x_5^2 f(x_5)$
[2] $\sum_{i=1}^{5} x_1^2 f(x_5)$
[3] $\sum_{i=1}^{5} x_i^2 f(x_5)$
[4] $\sum_{i=1}^{5} x^2 f(x_5)$
[5] None of the above.

Question 2

The cost of fish has increased in the ratio of 9 : 7. If the original cost was R5.60 per kg, what is the new price?

[1] R4.35
[2] R7.20
[3] R50.40
[4] R39.50
[5] None of the above.

Question 3

Six men and eight women have volunteered to serve on a committee. How many different committees can be formed containing three men and three women?

[1] 806 400 ways
[2] 336 000 ways
[3] 403 200 ways
[4] 224 000 ways
[5] None of the above.

Question 4

A car dealer is offering any 4 of 6 special options at one price on a specially equipped car being sold. How many different choices of specially equipped cars do you have?

[1] 15

[2] 30

[3] 120

[4] 12

[5] None of the above.

Question 5

A horisontal drinking trough for cattle is in the shape of a triangular prism. It is 6 m long and a cross section is in the shape of a triangle with base length 30 cm and height 20 cm. What is the capacity of the tank in litres?

[1] 360 litres

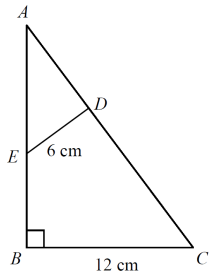
[2] 180 litres

[3] 36 litres

[4] 18 litres

[5] None of the above.

Question 6



Triangle ABC is similar to triangle ADE. DE = 6 cm and BC = 12 cm. If the area of triangle ABC is 90 cm^2, what is the area of triangle ADE?

[1] 90 cm^2

[2] 15 cm^2

[3] 22,5cm^2

[4] 45 cm^2

[5] None of the above.

Question 7

The inspector decides to take a sample of 20% of all the vehicles. Each type of vehicle is to be represented in the sample; so he will use the stratified random sampling technique. The number of light vans that should be inspected is:

[1] 16
[2] 5
[3] 32
[4] 26
[5] None of the above.

Questions 8 to 11 are based on the following information:
Suppose a company has 10 employees, 1 earning R160 000, 1 earning R120 000, 2 earning R60 000, 1 earning R40 000, and 5 earning R32 000.

Question 8

What is the mean salary for the company?

[1] R40 000
[2] R36 000
[3] R60 000
[4] R32 000
[5] None of the above.

Question 9

What is the median salary?

[1] R40 000
[2] R36 000
[3] R60 000
[4] R32 000
[5] None of the above.

Question 10

What is the mode of the salaries?

[1] R40 000
[2] R36 000
[3] R60 000
[4] R32 000
[5] None of the above.

Question 11

What is the standard deviation of the salaries?

[1] R40 000.00
[2] R44 621.87
[3] R38 416.55
[4] R41 583.12
[5] None of the above.

Questions 12 to 15 are based on the following information.
The income (in Rands) of seven drivers during the week are: 1 080; 2 000; 1 580; 1 540; 2 500; 1 800; 1 580.

Question 12

The average income is:

[1] 1 905.71
[2] 1 580.00
[3] 586.94
[4] 460.00
[5] None of the above.

Question 13

The mode of the income is:

[1] 1 905.71
[2] 1 580.00
[3] 586.94
[4] 460.00
[5] None of the above.

Question 14

The standard deviation of the income is:

[1] 1 905.71
[2] 460.00
[3] 400.00
[4] 586.94
[5] None of the above.

Question 15

The quartile deviation of the income is:

[1] 586.94
[2] 400.00
[3] 1905.71
[4] 460.00
[5] None of the above.

Questions 16 and 17 are based on the following information:
An index of clothing prices for 2005 based on 1998 is to be constructed. The clothing items considered are shoes and dresses. The information for prices and quantities for both years is given below. Use 1998 as the base period and 100 as the base value.

	1998		2005	
Item	Price ($)	Quantity	Price ($)	Quantity
Dress (each)	75	500	85	520
Shoes (pair)	40	1200	45	1300

Question 16

Determine Laspeyres' price index.

[1] 98.9
[2] 103.7
[3] 112.9
[4] 106.4
[5] None of the above.

Question 17

Determine the Paasche price index.

[1] 98.9
[2] 103.7
[3] 112.9
[4] 106.4
[5] None of the above.

Question 18

The number of items produced by a company for 1999 and 2005 and the wholesale prices for the two periods are:

	Price ($)		Number Produced	
Item Produced	1999	2005	1999	2005
Shear pins (box)	3	4	10 000	9000
Cutting compound (500 g)	1	5	600	200
Tie rods (each)	10	8	3000	5000

Find the index of the value of production for 2005 using 1999 as the base period.

[1] 99.7

[2] 127.1

[3] 100.3

[4] 110.6

[5] None of the above.

Question 19

Suppose the Consumer Price Index for the latest month is 134.,0 (1992 as 100). What is the purchasing power of the Rand?

[1] R75

[2] R0,075

[3] R0,75

[4] R7,5

[5] None of the above.

Question 20

Mrs Mthombeni inherits some money. She intends to spend R25 000 on a holiday in Mexico. How much money will this amount be in Mexican pesos (MXN)? Use the exchange rate:

$$1{,}6915 MXN = R1{,}00$$

The correct answer is:

[1] 14, 799.78MXN

[2] 25, 001.69MXN

[3] 34, 799.78MXN

[4] 42, 287.50MXN

[5] None of the above.

Question 21

Assume that in the year 2014 the Consumer Price index (CPI) was 102.7 in February and 110.5 in November. An employee's wage was R20 000 in February and R22 145 in November. In relation to the value of the rand in November, his wage has:

[1] Increased by R2 145.00

[2] Decreased by R566.52

[3] Decreased by R395.15

[4] Increased by R566.52

[5] None of the above.

10.2 Assignment 02 (Compulsory)

Due Date	Unique Number
25 August 2017	753582

Only students who are registered for the second semester should complete and submit this assignment.

Answer the questions online through myUnisa. Follow the instructions carefully. No extension will be granted for submission of this assignment. ***NO*** *manual or posted submissions will be allowed.*

Question 1

An electric utility company determines the monthly bill for a residential customer by adding an energy charge of 8.38 cents per kilowatt hour to its base charge of R4.95 per month. Write an equation for the monthly charge y in terms of x, the number of kilowatt-hours used.

[1] $y = 8.38x + 4.95$

[2] $y = 0.0838x + 4.95$

[3] $y = 0.838x + 4.95$

[4] $y = 0.0838x + 495$

[5] None of the above.

Question 2

Census Data from 2003 for various age groups show that for each R100 increase in the median weekly income for men, the median weekly income of women increases by R61.90. Also, for workers of ages 25 to 54 the median weekly income for men was R676 and for women was R527. Let M represent the median weekly income for men and W the median weekly income for women, and write the equation of the line that gives W as a linear function of M.

[1] $W = 0.381M + 269\,444$

[2] $W = 2.625M - 1247\,278$

[3] $W = 0.619M + 108\,556$

[4] $W = 1.6166M - 565\,084$

[5] None of the above.

Questions 3 and 4 refer to the following information:
Given the function $y = 12x - \frac{1}{2}x^2$

Question 3

Determine the vertex of the function.

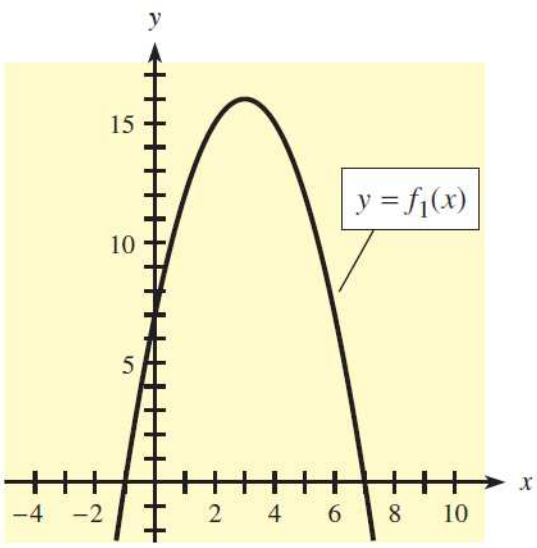
[1] $(-12; -216)$
[2] $(24; 0)$
[3] $(12; 72)$
[4] $(\sqrt{24}; 0)$
[5] None of the above.

Question 4

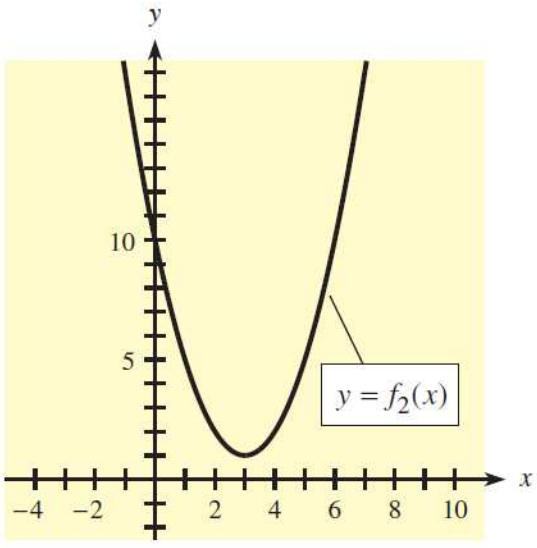
Determine the intercepts of the function.

[1] $(0; 0)$ and $(-12; -216)$
[2] $(0; 0)$ and $(24; 0)$
[3] $(0; 0)$ and $(12; 72)$
[4] $(0; 0)$ and $(\sqrt{24}; 0)$
[5] None of the above.

Questions 5 and 6 are on the following graphs below.



(a)



(b)

Question 5

Determine the vertex of each graph function.

[1] $f_1(x) - (3; 16)$ and $f_2(x) - (3; 1)$
[2] $f_1(x) - (0; 7)$ and $f_2(x) - (0; 10)$
[3] $f_1(x) - (-1; 0)$ and $f_2(x) - (7; 0)$
[4] $f_1(x) - (1; 3)$ and $f_2(x) - (0; 0)$
[5] None of the above.

Question 6

Determine the intercepts of each graph function.

[1] $f_1(x) - (3; 16)$ and $f_2(x) - (3; 1)$
[2] $f_1(x) - (0; 7)$ and $f_2(x) - (0; 10)$
[3] $f_1(x) - (-1; 0)$ and $f_2(x) - (7; 0)$
[4] $f_1(x) - (1; 3)$ and $f_2(x) - (0; 0)$
[5] None of the above.

Questions 7 and 8 are based on the following information:
If P rand is invested for t years at interest rate r, compounded continuously, then the future value of the investment is given by

Question 7

Express the doubling time of this investment in logarithmic format.

[1] $t = \frac{\ln 2}{r}$
[2] $t = \frac{-2 \ln 2}{\ln r}$
[3] $t = \frac{2 \log 2}{r}$
[4] $t = -2 \log 0.5r$
[5] None of the above.

Question 8

In the investment earns 10% compounded continuously, in how many years will it double?

[1] 4.604 years
[2] 6.93 years
[3] 6.02 years
[4] 2.602 years
[5] None of the above.

Question 9

Jenny has R90 000 to invest. She has chosen one relatively safe investment fund that has an annual yield of 10% and another, riskier one that has a 15% annual yield. How much should she invest in each fund if she would like to earn R10 000 in one year from her investments?

[1] R20 000 at 10% and R70 000 at 15%

[2] R70 000 at 10% and R20 000 at 15%

[3] R50 000 at 10% and R40 000 at 15%

[4] R40 000 at 10% and R50 000 at 15%

[5] None of the above.

Question 10

A nurse has two solutions that contain different concentrations of a certain medication. One is a 12.5% concentration and the other is a 5% concentration. How many cubic centimeters of each should she mix to obtain 20 cubic centimeters of an 8% concentration?

[1] $4cm^3$ at 12.5% and $16cm^3$ at 5%

[2] $16cm^3$ at 12.5% and $4cm^3$ at 5%

[3] $8cm^3$ at 12.5% and $12cm^3$ at 8%

[4] $12cm^3$ at 12.5% and $8cm^3$ at 8%

[5] None of the above.

Questions 11 to 12 refer to the information below:
A group of wholesalers will buy 50 dryers per month if the price is R200 and 30 per month if the price is R300. The manufacturer is willing to supply 20 if the price is R210 and 30 if the price is R230. Assuming that the resulting supply and demand functions are linear.

Question 11

Find the equilibrium point for the market.

[1] Quantity is 30 and Price is 265

[2] Quantity is 35 and Price is 275

[3] Quantity is 40 and Price is 250

[4] Quantity is 45 and Price is 260

[5] None of the above.

Question 12

If the wholesaler is taxed R14 per unit sold, what is the new equilibrium point?

[1] Quantity is 32 and Price is 320

[2] Quantity is 34 and Price is 280

[3] Quantity is 36 and Price is 270

[4] Quantity is 38 and Price is 260

[5] None of the above.

Question 13

When solving the following inequality: $-5x + 3 \geq x - 15$, the solution to one decimal place is

[1] $x \geq 2.0$

[2] $x \leq 4.5$

[3] $x \leq 3.0$

[4] $x \leq 5.0$

[5] None of the above.

Questions 14 and 15 are based on the information below:
CDF Appliances has assembly plants in Atlanta and Fort Worth, where they produce a variety of kitchen appliances, including a 12-cup coffee maker and a cappuccino machine. At the Atlanta plant, 160 of the 12-cup models and 200 of the cappuccino machines can be assembled each hour. At the Fort Worth plant, 800 of the 12-cup models and 200 of the cappuccino machines can be assembled each hour. CDF Appliances expects orders for at least 64 000 of the 12-cup models and at least 40 000 of the cappuccino machines. At each plant, the number of assembly hours available for these two appliances is constrained by each plant's capacity and the need to fill the orders. Let x be the number of assembly hours at the Atlanta plant, and let y be the number of assembly hours at the Fort Worth plant.

Question 14

Write the system of inequalities that describes these assembly plant constraints.

[1] $160x + 800y \geq 40\,000;\ 200x + 200y \geq 64\,000;\ x \geq 0;\ y \geq 0$

[2] $160x + 800y \geq 64\,000;\ 200x + 200y \geq 40\,000;\ x \geq 0;\ y \geq 0$

[3] $800x + 160y \geq 40\,000;\ 200x + 200y \geq 64\,000;\ x \geq 0;\ y \geq 0$

[4] $800x + 160y \geq 64\,000;\ 200x + 200y \geq 40\,000;\ x \geq 0;\ y \geq 0$

[5] None of the above.

Question 15

For CDF appliances to meet the expected orders, what is the minimum number of hours that needs to be allocated at each manufacturing plant? (Tip: Solve the system of inequalities and identify the extreme point(s) of the region of solution).

[1] (50; 150)

[2] (150; 50)

[3] (70; 100)

[4] (100; 70)

[5] None of the above.

Question 16

Acompany manufactures two types of chairs, standard and plush. Standard chairs require 2 hours to construct and finish, and plush chairs require 3 hours to construct and finish. Upholstering takes 1 hour for standard chairs and 3 hours for plush chairs. There are 240 hours per day available for construction and finishing, and 150 hours per day are available for upholstering. If the revenue for standard chairs is R89 and for plush chairs is R133.50, how many of each type should be produced each day to maximize revenue? Let x be the number of standard chairs produced each day, and let y be the number of plush chairs produced.

[1] (0; 50)

[2] (90; 20)

[3] (105; 10)

[4] (120; 0)

[5] None of the above.

Questions 17 and 18 are based on the information below:
A firm sells its product for R200 per unit. The cost per unit (per month) is $80 + x$ *, where* x *represents the number of units sold per month.*

Question 17

Define the marginal profit function.

[1] $MP(x) = 120 - 2x$

[2] $MP(x) = 80 - 2x$

[3] $MP(x) = 120x - 80$

[4] $MP(x) = 199x - 80$

[5] None of the above.

Question 18

What is the marginal profit at a production level of 20 units?

[1] R80

[2] R40

[3] R2 320

[4] R3 900

[5] None of the above.

Questions 19 and 20 are based on the information below:
The daily total cost in rand for a certain factory to produce x kitchen blenders is given by $C(x) = 0.001x^3 - 0.3x^2 + 32x + 2\,500$.

Question 19

Define the marginal cost function for these kitchen blenders.

[1] $MC = 0.003x^2 + 0.6x + 32$

[2] $MC = 0.001x^2 - 0.3x + 32$

[3] $MC = 0.003x^2 - 0.6x + 32$

[4] $MC = 0.002x^2 + 0.3x + 32$

[5] None of the above.

Question 20

Find the marginal cost when 80 units are produced.

[1] R36 per unit

[2] R3.2 per unit

[3] R99.2 per unit

[4] R68.8 per unit

[5] None of the above.

10.3 Assignment 03 (Compulsory)

Due Date	Unique Number
18 September 2017	743987

Only students who are registered for the second semester should complete and submit this assignment.

Answer the questions online through myUnisa. Follow the instructions carefully. No extension will be granted for submission of this assignment. ***NO*** *manual or posted submissions will be allowed.*

Question 1

If R2 000 is borrowed for one-half year at a simple interest rate of 12% per year, what is the future value of the loan at the end of the half-year?

[1] R1 785.71

[2] R1 886.,79

[3] R2 120.00

[4] R2 240.00

[5] None of the above.

Question 2

Thabo bought Gijima-Electric stock for R6 125.00 and that after 6 months, the value of her shares had risen by R138.00 and dividends totalling R144.14 had been paid. Find the simple interest rate she earned on this investment if she sold the stock at the end of the 6 months.

[1] 4.50%

[2] 4.,60%

[3] 4.71%

[4] 9.20%

[5] None of the above.

Question 3

If R8 000 is invested at 6% simple interest for 9 months, find the future value of the investment.

[1] R8 240

[2] R8 360

[3] R8 480

[4] R8 720

[5] None of the above.

Question 4

If R3 000 is invested for 4 years at 9% compounded annually, how much interest is earned?

[1] R4 080.00
[2] R4 234.74
[3] R4 294.22
[4] R4 299.79
[5] None of the above.

Question 5

What amount must be invested at 6.5%, compounded continuously, so that it will be worth R25 000 after 8 years?

[1] R14 986.46
[2] R14 863.01
[3] R14 925.27
[4] R14 883.01
[5] None of the above.

Question 6

If R5 000 is invested at 6% compounded continuously for 5 years, find the future value of the investment.

[1] R6 749.13
[2] R6 719.58
[3] R6 749.29
[4] R6 744.25
[5] None of the above.

Question 7

How long does it take an investment of R10 000 to double if it is invested at 8%, compounded continuously?

[1] 8.66 years
[2] 8.69 years
[3] 8.70 years
[4] 8.83 years
[5] None of the above.

Question 8

Jenny invests R2 000 at the end of each of 8 years in an account that earns 10%, compounded annually. After the initial 8 years, no additional contributions are made, but the investment continues to earn 10%, compounded annually, for 36 more years (until Jenny is age 65). How much does Jenny have at age 65?

[1] R530 112.61

[2] R707 028.03

[3] R1 305 281.52

[4] R598 253.61

[5] None of the above.

Question 9

Suppose R100 is deposited at the beginning of each month for 3 years in an account that pays 6%, compounded monthly. Find the future value.

[1] R3 933.61

[2] R3 953.28

[3] R4 038.05

[4] R4 287.66

[5] None of the above.

Question 10

Suppose R100 is deposited at the beginning of each month for 3 years in an account that pays 6%, compounded monthly. Find the future value. Suppose R100 is deposited at the beginning of each month for 3 years in an account that pays 6%, compounded monthly. Find the future value.

[1] R3 933.61

[2] R3 953.28

[3] R4 038.05

[4] R4 287.66

[5] None of the above.

Question 11

Find the lump sum that one must invest in an annuity in order to receive R1 000 at the end of each month for the next 16 years, if the annuity pays 9%, compounded monthly.

[1] R151 603.71

[2] R99 750.72

[3] R101 572.77

[4] R426 410.43

[5] None of the above.

Question 12

Find the present value of an annuity that pays R2 000 at the end of each 3-month period for 3,5 years and money is worth 4%, compounded quarterly.

[1] R26 007.41

[2] R29 428.12

[3] R32 185.28

[4] R29 894.84

[5] None of the above.

Question 13

What lump sum will be needed to generate payments of R5 000 at the beginning of each quarter for a period of 5 years if money is worth 7%, compounded quarterly?

[1] R82 003.95

[2] R83 764.40

[3] R85 230.28

[4] R87 774.26

[5] None of the above.

Question 14

Jack and Jill have R30 000 for a down payment, and their budget can accommodate a monthly mortgage payment of R850,00. What is the most expensive home they can buy if they can borrow money for 30 years at 7,8%, compounded monthly?

[1] R131 378.02

[2] R147 030.62

[3] R133 725.88

[4] R148 077.79

[5] None of the above.

Question 15

Find the amount of each payment if a debt of R25,000 is to be amortized with equal quarterly payments over 6 years, and money is worth 7%, compounded quarterly.

[1] R847.14

[2] R873.72

[3] R1 284.64

[4] R1 311.22

[5] None of the above.

Question 16

A new college graduate determines that she can afford a car payment of R350 per month. If the auto manufacturer is offering a special 2,1% financing rate, compounded monthly for 4 years, how much can she borrow and still have a R350 monthly payment?

[1] R15 953.73
[2] R16 011.25
[3] R17 336.65
[4] R17 509.81
[5] None of the above.

Question 17

A 42-month auto loan has monthly payments of R411,35. If the interest rate is 8,1%, compounded monthly, find the unpaid balance immediately after the 24th payment.

[1] R4 295.12
[2] R6 950.13
[3] R3 828.53
[4] R9 086.01
[5] None of the above.

Questions 18 to 20 are based on the information below:
A man buys a house for R200 000. He makes a R50 000 down payment and agrees to amortize the rest of the debt with quarterly payments over the next 10 years. Interest on the debt is 12%, compounded quarterly.

Question 18

What is the size of the quarterly payments?

[1] R6 489.36
[2] R6 636.91
[3] R8 652.48
[4] R8 849.21
[5] None of the above.

Question 19

What is the total amount of the payments?

[1] R346 099.20
[2] R265 476.40
[3] R259 574.40
[4] R353 968.40
[5] None of the above.

Question 20

What is the total amount of interest paid?

[1] R146 099.20

[2] R109 574.40

[3] R153 964.40

[4] R115 476.40

[5] None of the above.

11 LIST OF FORMULAE

The following list of formulæ will be provided in the examination. No explanations are given – you should know when to use which formula.

$I = PRT$

$y = ax + b$

$S = P(1 + RT)$

$y = ax^2 + bx + c$

$P = S(1 - dT)$

$x_m = -\dfrac{b}{2a}$

$x = -\dfrac{b}{2a} \pm \dfrac{\sqrt{b^2 - 4ac}}{2a}$

$\left[\left(\dfrac{GDP_n}{GDP_o}\right)^{\frac{1}{n}} - 1\right] \times 100$

$I_n = \dfrac{P_n}{P_o} \times 100$

$S = P \times (1 + R)^T$

$S = R\left[\dfrac{(1+i)^n - 1}{i}\right]$

$S = Rs_{\overline{n}|i}$

$P = \dfrac{S}{(1+R)^T}$

$P_L(n) = \dfrac{\sum p_n q_o}{\sum p_o q_o} \times 100$

$P = R\left[\dfrac{(1+i)^n - 1}{i(1+i)^n}\right]$

$P_P(n) = \dfrac{\sum p_n q_n}{\sum p_o q_n} \times 100$

$Q_L(n) = \dfrac{\sum p_o q_n}{\sum p_o q_o} \times 100$

$Q_P(n) = \dfrac{\sum p_n q_n}{\sum p_n q_o} \times 100$

$V = \dfrac{\sum p_n q_n}{\sum p_o q_o} \times 100$

$\overline{x} = \dfrac{1}{n}\sum_{i=1}^{n} x_i$

$S^2 = \dfrac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n-1}$

$P = Ra_{\overline{n}|i}$

$Q_D = \dfrac{Q_3 - Q_1}{2}$

$P = S - D$

$D = Sdt$

${}_mP_x = \dfrac{m!}{(m-x)!}$

$a = \dfrac{y_2 - y_1}{x_2 - x_1}$

$CV = \dfrac{S}{\overline{x}}$

${}_mC_x = \dfrac{m!}{(m-x)!x!}$

If $f(x) = x^n$, then $f'(x) = nx^{n-1}$.

If $f(x) = ax^n$, then $f'(x) = anx^{n-1}$.