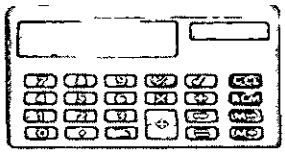
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

QMI1500 (497292) May/June 2017
SECOND PAPER

ELEMENTARY QUANTITATIVE METHODS

Duration 2 Hours 100 Marks

EXAMINERS
FIRST MR P MACHAKA
SECOND MRS MC STRYDOM

Programmable pocket calculator is permissible

Closed book examination

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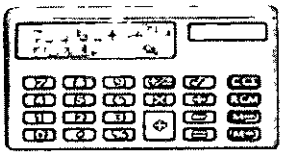

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This examination question paper remains the property of the University of South Africa and may not be removed from the examination venue

This paper consists of 17 pages, including a list of formulas (p 13) and instructions for completing the mark-reading sheet.

Answer ALL questions.

Please complete the attendance register on the back page, tear it off and hand it to the invigilator.

Answer *all* questions on the mark-reading sheet supplied and carefully follow the instructions for completing it. Also pay attention to the following

- Only one option (indicated as [1] [2] [3] [4]) per question is correct. Do not mark more than one option per question on the mark-reading sheet
- Marks will *not* be deducted for incorrect answers
- The paper consists of 30 questions for a total of 100 marks

You are strongly advised to write your name on the mark-reading sheet. In the event that you enter your student number incorrectly, we will still be able to link you to the mark-reading sheet.

Question 1

The expression

$$\left(\frac{x^5x^2x^{-3}}{x^0x^{-3}}\right)^{-2}$$

equals

[1] $\frac{1}{x^{14}}$

[2] x^5

[3] $\frac{1}{x^2}$

[4] x^{14}

[5] none of the above

Question 2

Suppose that $x_1 = 3 \times \sqrt{81}$, $x_2 = 27$, $x_3 = 64$, $x_4 = 125$ and $x_5 = 8$ Simplifying

$$\sum_{i=2}^{4} x_i^{\frac{1}{3}}$$

gives

[1] 12

[2] 14

[3] 15

[4] 17

[5] none of the above

Question 3

Suppose the semester mark of a certain module consists of a linear combination of the marks for two assignments Assignment 1 contributes 10% towards the semester mark and Assignment 2 contributes 90% towards the semester mark The final assessment mark consists of 80% of the examination mark and 20% of the semester mark Dumisani obtained 90% in Assignment 1 and 80% in Assignment 2 during the semester He also obtained an examination mark of 75% at the end of the semester What is Dumisani's final assessment mark?

[1] 80,00%

[2] 76,20%

[3] 81,67%

[4] 91,20%

[5] None of the above

Question 4

Jonas, Jacob, James and Joseph sold memory cards for cellular phones for a total profit of R2 596,80 The profit is shared between them in a ratio equal to that of the number of memory cards they sold Jonas sold 33, Jacob 40, James 23 and Joseph 48 memory cards respectively How much *money* does James get?

[1] R414,77
[2] R595,10
[3] R865,60
[4] R112,90
[5] None of the above

Question 5

Leeto is travelling by aeroplane There are five in-flight movies for him to watch In how many different ways can he choose any three movies out of the five to watch before the flight is over?

[1] 10
[2] 15
[3] 20
[4] 60
[5] None of the above

Question 6

Consider Question 5 again In how many ways can Leeto arrange three movies out of the five to watch them in a specific order?

[1] 10
[2] 15
[3] 20
[4] 60
[5] None of the above

Question 7

Refiloe's car averages 14 kilometres per litre of petrol The fuel tank capacity of her car is 50 litres The cost of petrol is R11,20 per litre Refiloe's trip to her destination is 250 kilometres She wants to reach her destination without stopping for a refuel Money is tight and her tank is almost empty The minimum amount of money she needs to pay for petrol to reach her destination is

[1] R156,80
[2] R200,00
[3] R403,32
[4] R560,00
[5] *none* of the above

Question 8

The expression for the straight line parallel to

$$y = 5x - 9$$

is

[1] $y = 5x - 10$

[2] $y = 9x - 5$

[3] $y = -5x + 9$

[4] $y = -9x + 10$

[5] none of the above

Question 9

A shop owner has a special offer on peaches He sells one packet of peaches for R33,00 and three packets of peaches for R90,00 Let x represent the number of packets sold and let y represent the price of the peaches The relationship between quantity sold and price is linear and can be written as

$$y = ax + b$$

Two data points, following directly from the given information, that will satisfy this linear relationship are

[1] $(33, 1)$ and $(90, 3)$

[2] $(1, 33)$ and $(3, 90)$

[3] $(33, 1)$ and $(3, 90)$

[4] $(1, 33)$ and $(90, 3)$

[5] none of the above

Question 10

Consider the quadratic function

$$y = 4x^2 - 15x + 10$$

The value of the discriminant is

[1] 10

[2] $-10\frac{5}{8}$

[3] 65

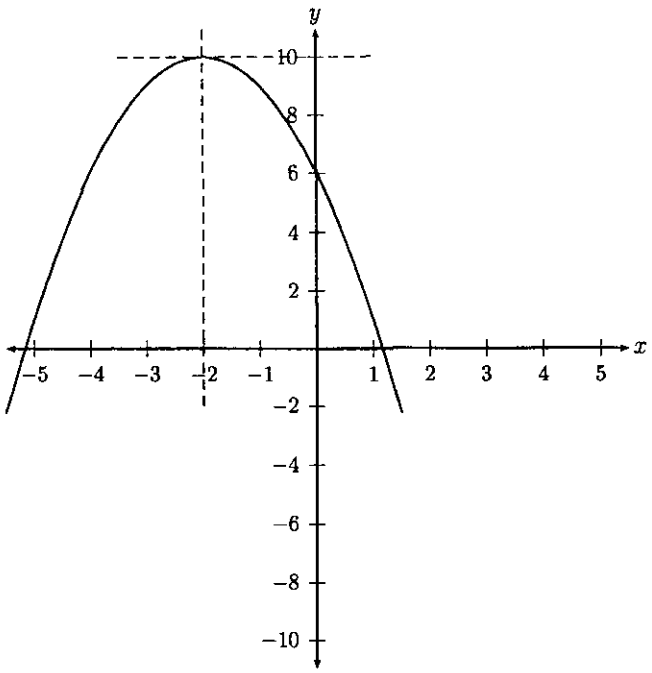
[4] $1\frac{7}{8}$

[5] none of the above

Question 11

Consider the following graph of the quadratic equation

$$y = ax^2 + bx + c$$



Which one of the following is true?

[1] The value of y at the turning point is negative

[2] The value of x at the vertex is positive

[3] The value of a is negative

[4] The discriminant is negative

[5] None of the above

Question 12

A man has 17 money notes in his wallet, consisting of 200-rand and 50-rand notes The total value of the notes is R2 200 If he makes a payment using all the 200-rand notes, how much money will be left in his wallet?

[1] R300,00

[2] R400,00

[3] R450,00

[4] R550,00

[5] None of the above

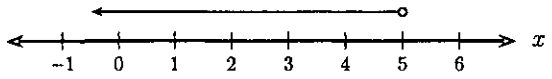
Question 13

The graphical representation of the inequality

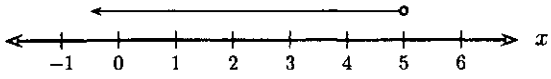
$$6x + 45 \geq 12x + 15$$

is

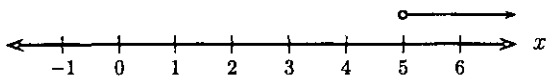
[1]



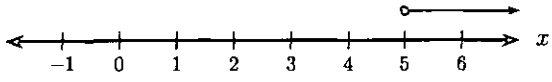
[2]



[3]



[4]



[5] none of the above

Question 14

A truck rental company has two types of trucks Type A has $20m^3$ of refrigerated space and $40m^3$ of non-refrigerated space Type B has $30m^3$ of refrigerated space and $20m^3$ of non-refrigerated space A food plant must transport at least $900m^3$ of refrigerated food and at most $1\,000m^3$ of non-refrigerated food Let x be the number of type A trucks and y be the number of type B trucks used for transportation of food The system of linear inequalities that represent this situation is

[1]
$20x + 30y \leq 900$
$40x + 20y \geq 1\,000$

[2]
$20x + 30y \geq 900$
$40x + 20y \geq 1\,000$

[3]
$20x + 30y \leq 900$
$40x + 20y \leq 1\,000$

[4]
$20x + 30y \geq 900$
$40x + 20y \leq 1\,000$

[5] none of the above

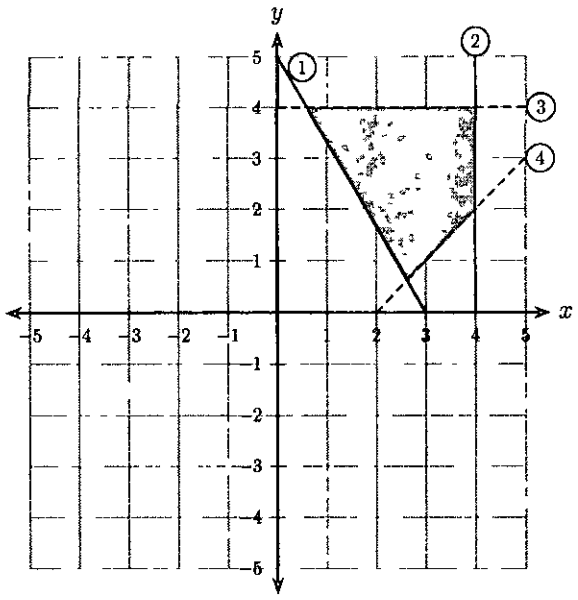
Question 15

Annuities can be defined as a sequence of

[1] different payments at different time intervals
[2] equal payments at different time intervals
[3] equal payments at equal time intervals
[4] different payments at equal time intervals
[5] none of the above

Question 16

Consider the following graph



The system of linear inequalities represented here is

[1]

$$\begin{aligned} 5x + 3y &\geq 15 \quad (1)\\ x \quad &\geq 4 \quad (2)\\ y &\leq 4 \quad (3)\\ -x + y &> -2 \quad (4)\\ x \quad &\geq 0\\ y &\geq 0 \end{aligned}$$

[2]

$$\begin{aligned} 5x + 3y &\geq 15 \quad (1)\\ x \quad &\leq 4 \quad (2)\\ y &\leq 4 \quad (3)\\ -x + y &> -2 \quad (4)\\ x \quad &\geq 0\\ y &\geq 0 \end{aligned}$$

[3]

$$\begin{aligned} 5x + 3y &\leq 15 \quad (1)\\ x \quad &\leq 4 \quad (2)\\ y &\leq 4 \quad (3)\\ -x + y &> -2 \quad (4)\\ x \quad &\geq 0\\ y &\geq 0 \end{aligned}$$

[4]

$$\begin{aligned} 5x + 3y &\geq 15 \quad (1)\\ x \quad &\leq 4 \quad (2)\\ y &< 4 \quad (3)\\ -x + y &> -2 \quad (4)\\ x \quad &\geq 0\\ y &\geq 0 \end{aligned}$$

[5] none of the above

Question 17

It is desired that the value of an investment at 5% simple interest per year should be R15 000 in five years' time from now How much should be invested now to reach the goal?

[1] R4 285,71

[2] R11 250,00

[3] R11 752,89

[4] R12 000,00

[5] None of the above

Question 18

Brakesh has earned R10 000 He lends Rita R4 000 for 12 months Rita agrees to repay the money with 15% per annum simple interest On the same day, Brakesh invests the remaining R6 000 at 15% per annum compounded monthly for 12 months At the end of 12 months from now, how much interest in total will Brakesh have earned?

[1] R11 564,53

[2] R964,53

[3] R600,00

[4] R1 564,53

[5] None of the above

Question 19

Khensani has started a new job He plans to save R5 000 at the end of each month for five years, in a savings account that earns interest at a rate of 6% per annum compounded monthly What will the accumulated amount be at the end of five years?

[1] R348 850,15

[2] R258 627,80

[3] R350 594,40

[4] R259 920,94

[5] None of the above

Question 20

A loan of R20 000 with an interest rate of 14% per annum compounded monthly is to be amortised by equal monthly payments over four years The first payment is due at the end of the first month The monthly payment is

[1] R309,23

[2] R313,20

[3] R833,38

[4] R546,53

[5] none of the above

Question 21

Paulinah must pay the bank R8 000 which is due in one year's time from now She pays R3 000 two months from now to lessen her debt All the payments are subject to an interest rate of 10% per annum compounded monthly How much must she pay the bank six months from now to settle her debt?

[1] R5 837,70

[2] R4 510,16

[3] R5 000,00

[4] R5 307,17

[5] None of the above

Question 22

A student has earned the following marks for four tests 78, 88, 93 and x His mean score for the four tests is 80 The value of x to two decimal places is

[1] 86,33

[2] 59,67

[3] 84,75

[4] 61,00

[5] none of the above

Question 23

The monthly sales figures of a certain company over a period of 25 months are given in the following data

144	145	157	183	163
138	120	140	148	126
160	150	128	168	154
140	162	165	135	140
134	146	152	170	122

The **mode** of the data to two decimal places is

[1] 183,00

[2] 161,00

[3] 140,00

[4] 120,00

[5] none of the above

Question 24

The staff of a college consists of professors, senior lecturers, lecturers, junior lecturers and administrative staff. A statistician wishes to determine the opinions of the staff in the college on their salaries. He has a list of all staff members arranged alphabetically according to their surnames. He randomly selects a professor as a starting point on the list. Then subsequently he selects every fifth member of staff on the list. The type of sampling he uses is called

[1] quantitative sampling

[2] random sampling

[3] systematic sampling

[4] stratified sampling

[5] none of the above

Question 25

The owner of a small company has fifteen employees. Three employees earn R15 000 per month, seven employees earn R10 000 per month and five employees earn R7 000 per month. The owner's monthly salary is R25 000. The **mean** monthly salary of all the people in the company to two decimal places is

[1] R32 828,57

[2] R57 000,00

[3] R11 666,67

[4] R10 937,50

[5] none of the above

Question 26

Suppose the rand per dollar exchange rate is R11,6812 = $1. Semakaleng wants to buy a camera in New York worth $965,00. Postage and packaging costs $15,25. What is the total amount in rands that he needs to pay?

[1] R11 450,50

[2] R11 287,61

[3] R991,93

[4] R980,25

[5] None of the above

Question 27

Suppose the real gross domestic product (GDP) for 2009 was 518 360 and the real GDP for 2013 was 641 819 What was the growth rate from 2009 to 2013 to three decimal places?

[1] 4,000%

[2] 23,817%

[3] 5,486%

[4] −5,200%

[5] None of the above

Question 28

The price of gold is $1 300,00 per fine ounce The exchange rate is

$$\text{R11,60} = \$1,00$$

If 31,10348 grams equal one fine ounce, what is the rand value of one kilogram of gold?

[1] R484 833,21

[2] R41 795,97

[3] R469 040,48

[4] R40 434,52

[5] None of the above

Question 29

Mosarasarane store sells bottled water at a special price The bottled water costs the store R3,00 each with a fixed cost of R280,00 per week for marketing The weekly cost, $C(x)$, is a linear function of the unit price, x, given by

$$C(x) = 280 - 3x$$

The income, $R(x)$, from selling the bottled water (in rand) is given by the quadratic function

$$R(x) = -20x^2 + 500x$$

The profit function, $P(x)$, is given by

$$P(x) = R(x) - C(x)$$

The marginal profit function is

[1] $P'(x) = -20x^2 + 497x - 280$

[2] $P'(x) = -40x + 503$

[3] $P'(x) = -20x^2 + 503x + 280$

[4] $P'(x) = -40x + 497$

[5] none of the above

Question 30

If

$$f(x) = 2 - 3x + 5x^3 - \frac{3}{x},$$

then the derivative of $f(x)$ is

[1] $f'(x) = -3 + 15x^2 + 3x^2$

[2] $f'(x) = -1 + 15x^2 + 3x^{-2}$

[3] $f'(x) = -3 + 15x^2 - 3x^{-2}$

[4] $f'(x) = -3 + 15x^2 + 3x^{-2}$

[5] none of the above

FORMULAE

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

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

$$I = PRT$$

$$S = P(1+RT)$$

$$D = SdT$$

$$P = S(1-dT)$$

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

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

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

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

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

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

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

$$y = ax + b$$

$$y = ax^2 + bx + c$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ROUGH WORK

15

ROUGH WORK

ROUGH WORK

ROUGH WORK

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EXAMINATION MARK READING SHEET EKSAMEN-MERKLEESBLAD

PART 1 (GENERAL/ALGEMEEN) DEEL 1

STUDY UNIT e g PSY100 X
STUDIE EENHEID bv PSY100-X

1

PAPER NUMBER
VRAESTELNOMMER

2

INITIALS AND SURNAME
VOORLETTERS EN VAN

3

DATE OF EXAMINATION
DATUM VAN EKSAMEN

4

EXAMINATION CENTRE (E G PRETORIA)
EKSAMENSENTRUM (BV PRETORIA)

5

STUDENT NUMBER
STUDENTENOMMER

6

7

UNIQUE PAPER NO
UNIEKE VRAESTEL NR

8

9

For use by examination invigilator

Vir gebruik deur eksamenopsiener

IMPORTANT

1 USE ONLY AN HB PENCIL TO COMPLETE THIS SHEET
2 MARK LIKE THIS
3 CHECK THAT YOUR INITIALS AND SURNAME HAS BEEN FILLED IN CORRECTLY
4 ENTER YOUR STUDENT NUMBER FROM LEFT TO RIGHT
5 CHECK THAT YOUR STUDENT NUMBER HAS BEEN FILLED IN CORRECTLY
6 CHECK THAT THE UNIQUE NUMBER HAS BEEN FILLED IN CORRECTLY
7 CHECK THAT ONLY ONE ANSWER PER QUESTION HAS BEEN MARKED
8 DO NOT FOLD

BELANGRIK

1 GEBRUIK SLEGS N HB POTLOOD OM HIERDIE BLAD TE VOLTOOI
2 MERK AS VOLG
3 KONTROLEER DAT U VOORLETTERS EN VAN REG INGEVUL IS
4 VUL U STUDENTENOMMER VAN LINKS NA REGS IN
5 KONTROLEER DAT U DIE KORREKTE STUDENTENOMMER VERSTREK HET
6 KONTROLEER DAT DIE UNIEKE NOMMER REG INGEVUL IS
7 MAAK SEKER DAT NET EEN ALTERNATIEF PER VRAAG GEMERK IS
8 MOENIE VOU NIE

PART 2 (ANSWERS/ANTWOORDE) DEEL 2

10

1	36	71	106
2	37	72	107
3	38	73	108
4	39	74	109
5	40	75	110
6	41	76	111
7	42	77	112
8	43	78	113
9	44	79	114
10	45	80	115
11	46	81	116
12	47	82	117
13	48	83	118
14	49	84	119
15	50	85	120
16	51	86	121
17	52	87	122
18	53	88	123
19	54	89	124
20	55	90	125
21	56	91	126
22	57	92	127
23	58	93	128
24	59	94	129
25	60	95	130
26	61	96	131
27	62	97	132
28	63	98	133
29	64	99	134
30	65	100	135
31	66	101	136
32	67	102	137
33	68	103	138
34	69	104	139
35	70	105	140

MARK READING SHEET INSTRUCTIONS

Your mark reading sheet is marked by computer and should therefore be filled in thoroughly and correctly

USE ONLY AN HB PENCIL TO COMPLETE YOUR MARK READING SHEET

PLEASE DO NOT FOLD OR DAMAGE YOUR MARK READING SHEET

Consult the illustration of a mark reading sheet on the reverse of this page and follow the instructions step by step when working on your sheet

Instruction numbers ⑪ to ⑩ refer to spaces on your mark reading sheet which you should fill in as follows

⑪ Write your paper code in these eight squares, for instance

P	S	Y	1	0	0	-	X

⑫ The paper number pertains only to first-level courses consisting of two papers

WRITE | 0 | 1 | for the first paper and | 0 | 2 | for the second If only one paper, then leave blank

⑬ Fill in your initials and surname

⑭ Fill in the date of the examination

⑮ Fill in the name of the examination centre

⑯ WRITE the digits of your student number HORIZONTALLY (from left to right) Begin by filling in the first digit of your student number in the first square on the left, then fill in the other digits, each one in a separate square

⑰ In each vertical column mark the digit that corresponds to the digit in your student number as follows [-]

⑱ WRITE your unique paper number HORIZONTALLY
NB Your unique paper number appears at the top of your examination paper and consists only of digits (e g 403326)

⑲ In each vertical column mark the digit that corresponds to the digit number in your unique paper number as follows [-]

⑩ Question numbers 1 to 140 indicate corresponding question numbers in your examination paper The five spaces with digits 1 to 5 next to each question number indicate an alternative answer to each question The spaces of which the number correspond to the answer you have chosen for each question and should be marked as follows [-]

◊ For official use by the invigilator Do not fill in any information here

Tear

attendance register (university copy) UNISA

Fill-in/MCQ

Examination period

Student number

Surname

First Names

Subject

Code of paper — Number of paper

Centre Date

This is to certify that I have read the rules governing the examinations as set out on the inside cover of this examination answer book and in the examination instructions

That the information supplied by me in this answer book is correct and valid

I undertake to adhere to the procedures, rules and regulations of the University of South Africa as published in the official brochures

Signature of candidate

ID Number

Batch No
28092015MCQ

Signature of invigilator

UNISA invigilator's personnel number

NOTE Not a valid document if not completed by the Invigilator

Tear

attendance register (student copy) UNISA

Fill-in/MCQ

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