

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
EDUCATION (ARTS, SCIENCE), AGED, AGRICULTURE, BACHELOR OF ARTS GENERAL

MATH 100: GENERAL MATHEMATICS

STREAMS: BED (SCI, ARTS), BSC AGRICULTURE, B.A GEN

TIME: 2 HOURS

DAY/DATE: MONDAY 11/12/2017

2.30 P.M – 4.30 P.M

INSTRUCTIONS:

- Answer question ONE and TWO other questions
- Adhere to the instructions on the answer booklet

QUESTION ONE: (30 MARKS)

(a) Let $A = \left\{ 5, 23, \sqrt{\frac{4}{9}}, \sqrt{2}, -1, -6, 4, \frac{22}{7}, 2, 0, 3.1453, 1, \sqrt{7} \right\}$. List the elements of A that are:

- Natural numbers
- Integers
- Rational numbers
- Even numbers.
- Irrational numbers (5 marks)

(a) Identify the property of real numbers being applied in each of the following

- $-2 \times 1 = -2$
- $(1 + 6) + 5 = 5 + (1 + 6)$
- If $10 - 7 = 3$ and $3 = \frac{18}{6}$ then $10 - 3 = \frac{18}{6}$ (3 marks)

(b) Without using a calculator

- Show that $\left(\frac{1}{64}\right)^{-2/3} = 16$ (3 marks)
- Evaluate $\log_3 \frac{27}{8}$ (3 marks)

(c) The function $f(x) = ax^2 + x - 7$ has a remainder of 3 when divided by $(x - 2)$.

- Find the value of a (3marks)
- (d) Given the following distribution of marks scored by some students in a Mathematics CAT
16, 3, 9, 17, 11, 10, 4, 15, 16, 9
Determine
- The range of the marks (2 marks)
 - The semi-inter quartile range (3 marks)
- (e) If $B = \{1,2,3,4,5\}$ is the domain of function $f(x) = x^2 + 1$, find the image of B under function $f(x)$. (4marks)
- (f) The mean age of 30 out-patient casualties in Ndagani Health centre is 20 years. It was later observed that while recording the data, the ages of two patients were wrongly recorded as 21 and 20 instead of 19 and 22 years. Find the correct mean age. (4marks)

QUESTION TWO: (20 MARKS)

- (a) After the September 2017 Supreme court ruling the national presidential election results, the price of a syringe packet was increased by sh.5, Mary bought 2 syringes fewer with sh.200. What is the current price of the syringe? (6marks)
- (b) Given that $f(x) = 2x - 4$ and $g(x) = x^2 + 5$
- Evaluate $4f(x) - g(2)$ (4marks)
 - Find $g^{-1}(25)$ (4marks)
 - Show that $(f \circ g)(1) \neq (g \circ f)(1)$ (6 marks)

QUESTION THREE: (20 MARKS)

- (a) (i) Use long division method to show that $2x^3 + x^2 - 13x + 6$ is divisible by $(x - 2)$ (3marks)
- (ii) Verify your result (i) using the factor theorem (2marks)
- (iii) Hence solve $2x^3 + x^2 - 13x + 6 = 0$ (4marks)
- (b) Differentiate the following functions using method of choice or the indicated technique in the bracket

- (i) $y = -\frac{1}{4}x^{-2} - 5x^7 + 10x - 0.1$ (2 marks)
- (ii) $y = (2 - x)(3x^2 + 7)$ (Product rule) (3marks)
- (iii) $y = \frac{5x^2-1}{x+3}$ (Quotient rule) (3 marks)
- (iv) $y = (3x^3 - 2)^2$ (Chain rule) (3 marks)

QUESTION FOUR: (20 MARKS)(a) Solve for x

- (i) $9 - 4x^2 = 0$ (by factorization) (3marks)
- (ii) $4^{x+2} + 2^{2x+3} = 96$ (4marks)
- (iii) $\log_2(x^2 - 6x) = 3 + \log_2(1 - x)$ (5 marks)

(b) Sketch the curve represented by $y = x^3 + 3x^2 - 9x - 4$ (8marks)**QUESTION FIVE: (20 MARKS)**

(a) Distinguish the following terms as used in statistics, give appropriate examples if possible

- (i) A sample and population
- (ii) A continuous variable and non-continuous variable
- (iii) Class boundaries and class limits (6 marks)

(b) Organize the data below in class intervals of 45-49, 50-54,.....e.t.c

54 66 63 47 58 67 59 63 50 45

57 64 62 48 55 60 52 68 52 61

58 49 55 51 58 53 66 45 52 63

55 61 68 52 63 46 65 56 46 62

(2 marks)

(c) Fifty candidates entering medical training programme were given a psychological profile test. The following table gives the distribution of their scores.

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Score interval	60-79	80-89	90-119	120-139	140-159
Number of candidates.	8	16	12	8	6

Calculate

- i) The mode (3 marks)
 - ii) The mean score (3 marks)
 - iii) Upper quartile (3 marks)
 - iv) The standard deviation (3 marks)
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