



UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELORS OF SCIENCE IN UPGRADING NURSING

MATH 100: GENERAL MATHEMATICS

STREAMS: Bed Arts

Y1S2 (May-July2021 upgradingNurs)

TIME: 2HRS

DAY/DATE:
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INSTRUCTIONS:

- Answer question **ONE** and **TWO** other questions
- Sketch maps and diagrams may be used whenever they help to illustrate your answer
- This is a **closed book exam**, No reference materials are allowed in the examination room
- There will be **No** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely

QUESTION ONE: (30 MARKS)

(a) List all the possible sets of real numbers in which each of the following numbers belong:

- (i) $\sqrt{\frac{25}{49}}$
- (ii) -2.0
- (iii) π

(5 marks)

(b) Show that ${}^{lm}\sqrt{\frac{a^l}{a^m}} \times {}^{mn}\sqrt{\frac{a^m}{a^n}} \times {}^{nl}\sqrt{\frac{a^n}{a^l}} = 1$

(4 marks)

(c) The following are cat 1 results for 10 students in a General Mathematics class marked out of 20.

11, 8, 10, 18, 5, 8, 11, 14, 4, 6

Determine:

- (i) The range (1 mark)
- (ii) Inter Quartile Range (3 marks)
- (iii) The standard deviation. What does the value of the standard deviation depict in this performance? (5 marks)

- (d) The mean mark of 100 students was found to be 60. Later on it was discovered that a mark 43 was misread as 53. Find the correct mean mark. (3 marks)
- (e) Obtain the remainder when $2x^3 + x^2 - 13x + 6$ is divided by $x-1$ (3 marks)
- (f) Given the equation of the curve as $y = 2x^2 - 12x + 4$, find and state the nature of its turning point (4 marks)

QUESTION TWO: (20 MARKS)

- (a) Given that $f(x) = 4x - 1$ and $g(x) = x^2 + 5$
- (i) Evaluate $4f(x) - g(6)$ (3 marks)
- (ii) Evaluate $(g \cdot f)(x)$ (2 marks)
- (iii) Find $g^{-1}(20)$ (3 marks)
- (iv) Show that $(f \circ g)(1) \neq (g \circ f)(1)$ (5 marks)
- (b) Given that $\log x = 5$, $\log y = 2$ and $\log z = 6$, evaluate
- $$\log \left(\frac{x^2 \sqrt{z}}{y^4} \right) \quad (4 \text{ marks})$$
- (c) Solve for x in $2^{x+5} \div 4^{-x} = 32$ (3 marks)

QUESTION THREE: (20 MARKS)

- (a) The functions $x^3 - 7x - 4$ and $3x^3 - 3x^2 + bx + 14$ have the same remainder when divided by $(x - 3)$. What is the value of b ? (5 marks)
- (b) Differentiate the following functions using method of choice or the indicated technique in the bracket
- (i) $y = -\frac{1}{4}\sqrt{x} + 5x^{-3} + 8x - 0.1$ (3 marks)
- (ii) $y = (5 - 2x)(3x^2 + 6)$ (Product rule) (3 marks)

(iii) $y = \frac{x^2-4}{x-3}$ (Quotient rule) (3 marks)

(iv) $y = (2x^{-5} - 3)^3$ (Chain rule) (3 marks)

(a) Given that $g(x) = \begin{cases} x^3 + 7 & \text{if } x \leq -2 \\ -2 & \text{if } -2 < x \leq 0 \\ 10 - x & \text{if } x > 0 \end{cases}$

Evaluate: (i) $g(0)$ (ii) $g(-3)$ (iii) $g(3)$ (3 marks)

QUESTION FOUR: (20 MARKS)

(a) Solve for x

(i) $9^{(x-3)} \times 81^{(1-x)} = 27^{-x}$ (3 marks)

(ii) $\log_2(x^2 - 6x) = 3 + \log_2(1 - x)$ (4 marks)

(b) Find which of the two curves $y = x^3 + x + 4$ and $y = x^3 - 2x^2 + 2$ has a steeper gradient at $x = 1$ (4 marks)

(c) Find and state the nature of the turning points of the curve represented by the function $y = x^3 + 3x^2 - 9x - 1$. Hence sketch the curve represented by the function (9 marks)

QUESTION FIVE: (20 MARKS)

(a) A survey of 500 randomly chosen individuals is conducted. The individuals are asked to name their favorite sport. The pie chart in Figure 1 summarizes the results of this survey.

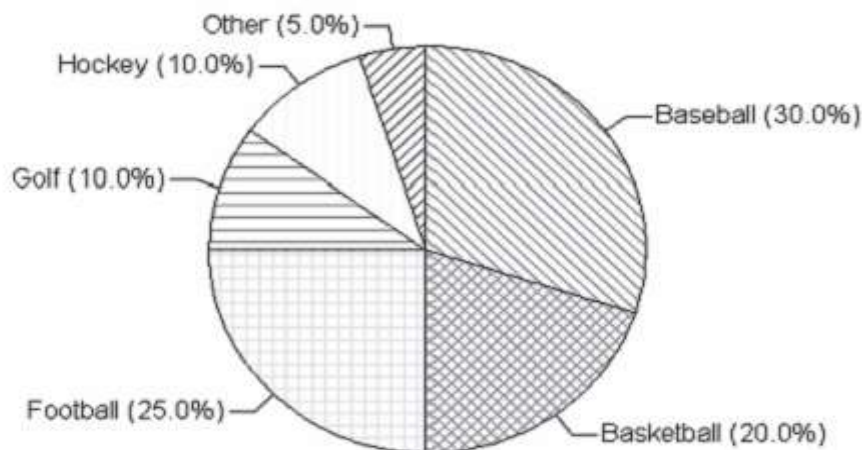


Figure 1

- (i) How many individuals in the survey gave football as their favorite sport? (2 marks)
- (ii) How many gave a sport other than basketball as their favorite sport? (3 marks)

(b) Fifty candidates for recruitment positions in Chuka Referral Hospital were given a psychological profile test. The following table gives the distribution of their scores.

Score interval	60-79	80-99	100-119	120-139	140-159
Number of candidates.	8	16	12	8	6

Find:

- i. The mean score (3 marks)
- ii. The mode (4 marks)
- iii. The median (4 marks)
- iv. The 80th percentile score (4 marks)

END