



KENYATTA UNIVERSITY
DIGITAL SCHOOL OF VIRTUAL AND OPEN LEARNING (DSVOL)
EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN
INFORMATION TECHNOLOGY

SIT 404: MANAGEMENT MATHEMATICS

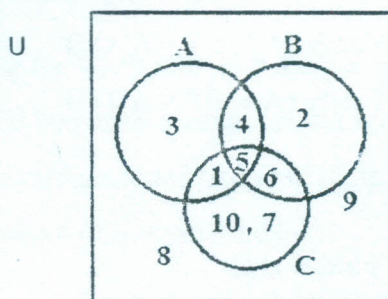
2ND TRIMESTER 2023/2024

TIME: 2 Hours

INSTRUCTIONS: Attempt question ONE and any other TWO questions

QUESTION ONE

- a) Find the domain of the function $f(x) = \sqrt{2-x}$ (2 marks)
- b) In a group of 60 people, 27 like cold drinks and 42 like hot drinks and each person likes at least one of the two drinks. How many people like both coffee and tea? (3 marks)
- c) From the adjoining Venn diagram, find the following sets.



- i) $(B \cup C)'$ (2 marks)
- ii) $A \cap B$ (2 marks)
- iii) $(A \cup C)$ (2 marks)
- d) Evaluate $\int_0^1 4x - 6\sqrt{x^2} dx$ (5 marks)

c) Let $f(x) = 2x^2 + 1$. Use the limit definition of the derivative to find $f'(x)$ (3 marks)

f) Solve the inequality $-3 < \frac{(6-3x)}{2} < 6$ (3 marks)

g) Solve the equation $-3x^2 + 6x - 48 = 0$ for x using completing square method and enter exact answers only (no decimal approximations). If there is more than one solution, separate your answers with commas. If there are no real solutions, write NO SOLUTION. (5 marks)

h) Find the following limits

i) $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 4} - 2}{x^2}$ (6 marks)

QUESTION TWO

a) Suppose John deposits Kshs 15,000 at the end of each year for the next 6 years in an account paying 8% per year compounded annually. What is the future value of the annuity that he will encounter? (4 marks)

b) Let $A = \{3, 5, 7\}$, $B = \{2, 3, 4, 6\}$ and $C = \{2, 3, 4, 5, 6, 7, 8\}$.

i) Verify $(A \cap B)' = A' \cup B'$ (4 marks)

ii) Verify $(A \cup B)' = A' \cap B'$ (4 marks)

iii) Find $P(A \cap B)$ (4 marks)

iv) Find $B \cup C$ (4 marks)

QUESTION THREE

a) Evaluate the following integrals $\int \frac{3}{5y+4} dy$ (5 marks)

b) Mr. Rex and Miss Cera both pledge to invest equal amounts in the Children's Museum Endowment in 5 years. The endowment fund earns 6.5% interest compounded annually. Mr. Rex prefers to make a contribution of \$500 at the end of year. Miss Cera prefers to

give one lump sum payment today. What about will she have to contribute to be worth the same as Mr. Rex's contribution? (5 marks)

c) Using the limit definition to find the derivative of $f(x) = 2x^2 - 16x + 35$ (10 marks)

QUESTION FOUR

a) Let $f(x) = \begin{cases} x^2 + 8x + 15 & \text{if } x \leq 2 \\ 4x + 7 & \text{if } x > 2. \end{cases}$ find $\lim_{x \rightarrow 2^+} f(x)$.

(3 marks)

b) Examine whether or not the function

$$f(x) = \begin{cases} x^3 - 2x + 1 & \text{if } x \leq 2 \\ 3x - 2 & \text{if } x > 2 \end{cases}$$

is continuous at $x = 2$

(4 marks)

c) Claye's family buys a house for \$ 275,000 with a down payment of \$55,000. They take out a 30-year mortgage for \$220,000 at an annual interest rate of 6%.

i) Find the monthly payment needed to pay off this loan. (5 marks)

ii) What is the total amount of interest paid? (5 marks)

d) Solve the inequality and graph its solution set in a number line.

$$-1 \leq -4x + 15 \leq 7.$$

(3 marks)

QUESTION FIVE

a) Determine whether the following systems have unique solutions and sketch their solutions graphs.

i) $2x + 6y = -3$

$$x + 3y = 2$$

(5 marks)

ii) $3x - 2y = 8$

$2x + 5y = -1$

(5 marks)

- b) The students from Mr. Kennedy's class were surveyed. 19 students take mathematics, 10 students take mathematics and Physics, 14 students take only chemistry, 12 students take chemistry and mathematics and 3 students take all three subject. 2 of students do not take any of these three subjects and all physics students take mathematics.

iii) Show the information in a Venn diagram.

(3 marks)

iv) How many students

a) Take only mathematics

(3 marks)

b) Take chemistry and not mathematics

(2 marks)

c) Take chemistry of physics

(2 marks)