Strathmore
UNIVERSITY

STRATHMORE BUSINESS SCHOOL

BACHELOR OF SCIENCE IN SUPPLY, CHAIN AND OPERATIONS MANAGEMENT

END OF SEMESTER EXAMINATION

MATH 1105: BUSINESS MATHEMATICS

DATE:13/10/2023 TIME:2 Hours

INSTRUCTIONS

1. This examination consists of **FIVE** questions
2. Answer Question ONE (COMPULSORY) and any other **TWO** questions

QUESTION ONE (30Marks)

1. (a) Solve the inequality $\left|\frac{2x+3}{3}\right| \geq 5$ and present the results in interval notation . (6 marks)

(b) Find the intersection or union given A=$\{1,2,3,4\}$, B=$\{3,4,5\}$,C=$\{3,4,5,6,7\}$ and D=$\{6,7,8,9\}$ find

i. $A \bigcap D$ (1mk)
ii. $A \bigcap (C \cup D)$ (2mks)
iii. $A \bigcap (B \cup C)$ (2mks)
(5 marks)

(c) i. Find the domain of the function $f(x) = \sqrt{9-x^2}$.(2 marks)

ii. Given that $f(x) = 3x^2 - x + 10$ and $g(x) = 1 - 20x$ find
(a) $f \circ g(x)$ (2 marks)

(a) $f \circ g(5)$ (1mark)

(d) At XYZ cinema, it costs \$ 47 to purchase 4 adult and 2 child tickets .It also costs \$ 25.50 to purchase 1 adult and 3 child tickets . Using matrices approach determine the cost of an adult and a child price ticket at the cinema . (6 marks)

(e) i. Find the sum of the series $12 + 16 + 20 + \cdots + 84$.. (2marks)

ii. If the 5^{th} term of a geometric series is 162 and 8^{th} is 4374. Find the common ratio and 10^{th} term . (3marks)

(f) A committee of 5 people is to be chosen from a group of 6 men and 4 women . How many Committees are possible

i. There are to be 3 men and 2 women. (2marks)

ii. There are to be men only . (1mark)

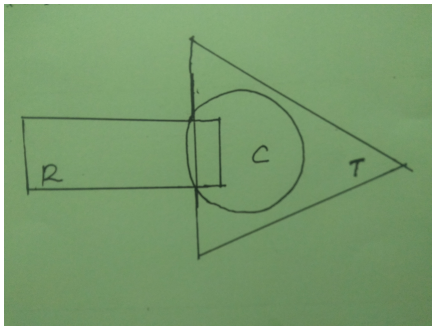
QUESTION TWO (20Marks)

2. (a) i. An employee of Kericho tea hotel is paid \$ 10 per hour and earns an extra \$ 30 in the form of tips per week. In one week , the employee made a total of \$380 . How many hours did the employee work? . (2marks)

ii. The minimum daily requirements from the liquid portion of a diet are 300 calories, 36 units of vitamin A, and 90 units of vitamin C. A cup of dietary drink X cost \$ 0.12 and provides 60 calories , 12 units of vitamin A and 10 units of vitamin C. A cup of dietary drink X cost \$ 0.15 and provides 60 calories , 6 units of vitamin A and 30 units of vitamin C.
(a)Formulate linear inequalities from information above. (2marks)

(b)Present the inequalities in (a) above graphically and shade the unwanted region. (3 marks)
(c)How many cups of each drink should be consumed each day to minimize the cost and still meet the daily requirements?. (3marks)

(b) i. Let C= the set of points inside the circle, T=the set of points inside the triangle and R=The set of points inside the rectangle . Shade the following set separately



(a)$R \bigcap C$. (1mk)
(b) $R \bigcap T \bigcap C)$. (1mks)
(c) $R \cup C$ (1mks)

ii. An advertising agency finds that of its 220 clients, 140 use television, 125 use radio and 150 use magazine. Also,105 use television and magazines, 103 use television and radio, 120 use radio and magazines, 101 use all the thee.
(a) Present the information above in a venn diagram . (4 marks)

(b)How many used only one media. (2 marks)

(c) How many used television and magazine . (1mark)

QUESTION THREE (20Marks)

3. (a) i. Given the function $f(x) = 3x^3 - 4x^2 - 3x + 7$, find $f(2)$ and $f(x-2)$. (3 marks)

ii. Solve the quadratic equation by factorization method $x^2 - 6x + 9 = 0$

(a) i. Karani invested $ 10,000 at three years in a bank earning a simple interest rate of 12% per annum. Determine the simple interest earned. (3 marks)

ii. Determine the future value of ksh 20,000 which is invested for 4 years compound semi-annually at 4%. (4marks)

(a) Suppose a toy car manufacturer has fixed cost of $4000 that must be paid no matter how many toy car are produced .In addition, there are variable cost of $2 per toy. At a production level x toys, the variable cost are$2x$ dollars and the total cost is given by
$C(x) = 4000 + 2x(dollars)$

i. Find the cost of producing 1000 toys. (2 marks)

ii. What additional cost incurred if the production level is raised from 1,000 to 1,300 . (3marks)

iii. How many toys car may be produced at a cost of $ 7,000 . (2marks)

QUESTION FOUR (20Marks)

4. (a) i. Let

$$A = \begin{pmatrix} 5 & 15 & 25 \\ 35 & 45 & 65 \end{pmatrix}$$

$$B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}$$

Find
(a)A+B . (2marks)
(b) A+2B . (3marks)

ii. (a) Determine the determinant and the inverse of the matrix. (4 marks)

$$\begin{pmatrix} 1 & 1 \\ 8.50 & 4.50 \end{pmatrix}$$

(b) Using the information in (ii a) A joypasers bus company sold 1000 tickets

in the year 2022. Adult ticket cost $8.50 while children's cost $ 4.50 , and total of $7300 was collected . How many tickets of each kind were sold by the company . (8 marks)

(b) Solve the following equation simultaneously by using elimination method . (3marks)
x+y=5
2x-y=4

QUESTION FIVE (20Marks)

5. (a) i. Suppose a ball always rebounds 2/3 of the height from which it falls and the ball is dropped from a height of 6 feet . Find the total distance that the ball travels . (7 marks)

ii. If the 7^{th} term of an arithmetic series is 22 and the 12^{th} term is 37; find the series. (5 marks)

(b) i. Otieno , Njoroge, Wafula and Nyandri are running for the offices of the president, secretary ad treasurer .In how many ways can these offices be filled . (3 maks)

ii. In a box , there 5 black pens, 3 white pens and 4 red pens . In how many ways can 2 black pens, 2 white pens and 2 red pens can be chosen. (5 marks)