



MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS 2023/2024 ACADEMIC AFFAIRS FIRST YEAR, FIRST SEMESTER

SCHOOL OF BUSINESS AND ECONOMICS BACHELOR OF COMMERCE

COURSE CODE: BCM1108-1

COURSE TITLE: BUSINESS MATHEMATICS ONE

DATE: 30/1/2024

TIME: 0830-1030 HRS

INSTRUCTIONS:

- Attempt Question One **and** Any Other **Two** Questions: Clear Examples,
- Do Not Write On The Exam Question Paper.

QUESTION 1

a) For each expression, state whether it is TRUE or FALSE

i. A set of all university students in earth is a finite set.

ii. $A = \{0\}$ is an empty set.

iii. $\{1,2,3,4\} = \{4,1,2,3\}$

iv. Given Sets A & B, $A - B = B - A$ **(2MARKS)**

b) A company manufactures and sells television sets per month. The monthly cost and demand functions are:

$$C = 60,000 + 60X$$

$$P = 200 - X/50$$

Where: X: Number of sets

Required:

i) Find the maximum revenue **(2 MARKS)**

ii) Find the maximum profit. **(2 MARKS)**

iii) The production level that will realize the maximum profit **(2 MARKS)**

iv) The price the company should charge to realize the maximum profit **(2 MARKS)**

C) In a class of 24 students 12 students play the piano 13 students play the guitar 4 students play neither instrument. A student is selected at random work out the probability that the student only plays the guitar. **(5 MARKS)**

D) The Student Council decides to raise money by organizing a dance. Tickets are Sh. 7.50 each, but the cost of hiring the video-DJ is Sh. 1200. How many tickets must be sold to make a profit of more than Sh. 1500? **(5 MARKS)**

QUESTION TWO

a) In a certain country there are two daily newspapers, the Citizen and the Mirror. A researcher interested in the reading habits of the population of this country found out the following:

- Of the readers who read the Citizen on a given day, 50% do so the following day while the rest change to the Mirror.

- Of those who read the Mirror on a given day, 40% change to the Citizen the following day.

- Yesterday, the readership levels were 30% for the Citizen and 70% for the Mirror. Assume all Markov conditions hold.

Required:

a) Determine readership levels for both dailies.

i) Today

ii) Tomorrow

(5 marks)

b) If the process persists long enough what are the eventual readership levels?

(6 MARKS)

a) List any two key characteristics of a straight line.

(4 MARKS)

QUESTION THREE

a) Discuss the practical relevance of studying business mathematics in business.

(5 MARKS)

b) A revenue function is quadratic in nature. When $x=5$, $R=50$ whereas when $x=4$, $R=48$.

Where: X: Units sold

R: Revenue

Required: Determine the revenue function.

(5 MARKS)

c) For a certain good, the collection percentage of credit issued in any month is an exponential function of the time since credit was issued. Specifically the function which approximates this relationship is

$$P = 0.9 (1 - e^{-0.7t}) \quad t \geq 0$$

Where: P = percentage of debtors (in shillings) collected t months after the credit is granted

Required

Calculate the percentage of debtors recovered after

i) 3 months

ii) 7 months

(5 MARKS)

QUESTION 4

a. Explain any one importance of studying calculus in business and management.

(2 MARKS)

b. A firm's price function is given as $P=150-2X$ and the total cost function is given as $C=10+5X^2$.

Required

i. Determine the output level that maximizes profit.

(2 MARKS)

ii. Compare the output level and price that maximizes revenue with the one in (i) above.

(2 MARKS)

c. A gym runs two fitness classes, spinning and circuits. On Saturday 100 people visited the gym. 18 people attended the spinning class. 10 people attended both classes. 56 people did not attend either class.

Required

i. Represent all the data values in a Venn diagram.

(5 MARKS)

ii. Attended only circuits.

(2 MARKS)

iii. Attended spinning, given that they attended circuits.

(2 MARKS)

/End/