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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR**  
**FIRST YEAR, FIRST SEMESTER EXAMINATION**  
**FOR THE CERIFICATE IN BUSINESS MANAGEMENT**  
**CBM 017-BUSINESS CALCULATION AND STATISTICS**

Date: 15<sup>th</sup> August 2023  
Time: 11.30am-1.30pm

INSTRUCTIONS TO CANDIDATES:

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Given the matrices  $A = \begin{pmatrix} 8 & 1 \\ -2 & 3 \end{pmatrix}$ ,  $B = \begin{pmatrix} 1 & -4 \\ 2 & 2 \end{pmatrix}$ , determine  $(AB)^{-1}$ . (4 marks)
- b) Solve the quadratic equation  $3x^2 - 5x - 7 = 0$  using quadratic formula. (3 marks)
- c) Solve using inverse matrix method
- $$\begin{aligned} 3x - 4y &= -9 \\ 4x - 5y &= 12 \end{aligned} \quad (3 \text{ marks})$$
- d) Given the following set of data; 15, 10, 23, 16, 8, 17, 10. Determine
- Median (2 marks)
  - Mode (1 mark)
  - Variance (3 marks)
- e) Solve using the elimination method the following simultaneous equations (3 marks)
- $$\begin{aligned} y + 2x &= 4 \\ 3x - y &= 1 \end{aligned} \quad (3 \text{ marks})$$
- f) Discuss two methods of data collection and state one advantage for each. (4 marks)
- g) A basket contains four oranges, three mangoes and five apples. Two fruits are selected randomly without replacement from the basket. What is the probability that
- The second fruit is a mango? (2 marks)
  - The two fruits are the same? (2 marks)

QUESTION TWO (20 MARKS)

- a) Differentiate between sample and population (2 marks)
- b) Using the substitution method, find the value of a and b given that
- $$\begin{aligned} 2a + 4b &= 2 \\ b - 3a &= 11 \end{aligned} \quad (3 \text{ marks})$$
- c) The following data show prices of ice cream at different times of the year: 45, 30, 48, 40, 55, 37, 42, 58, 35, 46, 44. Calculate
- Mean (2 marks)
  - 6<sup>th</sup> decile (4 marks)
  - 40<sup>th</sup> percentile (4 marks)
- d) A trader bought 2 cows and 9 goats for a total of Ksh 98200. If she had bought 3 cows and 4 goats, she would have spent Ksh 2200 less.
- Form two equations to represent the above information (2 marks)
  - Use the matrix method to solve the equations to determine the cost of a cow and that of a goat. (3 marks)

**QUESTION THREE (20 MARKS)**

- a) Given the matrix  $A = \begin{pmatrix} -2 & 1 \\ 5 & 6 \end{pmatrix}$  and  $B = \begin{pmatrix} 7 & 8 \\ -3 & 1 \end{pmatrix}$ , determine
- $A+B$  (2 marks)
  - $AB$  (3 marks)
- b) The CAT marks for nine students are given as follows: 20, 15, 22, 18, 23, 17, 14. Calculate
- Geometric mean (3 marks)
  - Harmonic mean (3 marks)
  - Quartile deviation (4 marks)
- c) Draw a bar chart to represent the data given below

Brand	Nike	Jordan	Airforce	Bata	Adidas	Reebok
Sales	35	25	17	25	13	20

(5 marks)

**QUESTION FOUR (20 MARKS)**

- a) Explain the two sources of data, and give an example for each. (4 marks)
- b) The following frequency distribution table represents the overall marks obtained in a final examination

Marks	10-19	20-29	30-39	40-49	50-59
Frequency	5	9	12	10	3

Calculate

- Mean (3 marks)
  - Median (3 marks)
  - Mode (3 marks)
  - Standard deviation (4 marks)
- c) Solve by completing the square method the equation  $x^2 + 4x - 5 = 0$  (3 marks)

**QUESTION FIVE (20 MARKS)**

- a) Two marbles are drawn in turns from a pack containing 3 red, 6 white, 9 green and 7 black marbles. If this is done with replacement, determine the probability of drawing:
- two white marbles (2 marks)
  - a black then a green marble (3 marks)
  - no red marble (2 marks)
- b) If the drawing of marbles is done without replacement, find the probability of drawing
- Two red marbles (2 marks)
  - A green then a white marble (3 marks)
- c) Solve using inverse matrix method

$$\begin{aligned} 5x - 3y &= 7 \\ 2x - y &= 5 \end{aligned} \quad (4 \text{ marks})$$

- b) Given the determinant of the matrix  $M = \begin{pmatrix} x+1 & 1 \\ x & 4 \end{pmatrix}$  is 13, determine the value of x. (4 marks)