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**KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY  
UNIVERSITY EXAMINATION, 2023/2024 ACADEMIC YEAR  
FOR THE CERTIFICATE IN PROCUREMENT AND SUPPLY CHAIN  
MANAGEMENT**

**CPS 017: BUSINESS CALCULATIONS 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;

$$3x - 4y = -9$$

$$4x - 5y = 12 \quad (3 \text{ Marks})$$

- 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)
- $$y + 2x = 4$$
- $$3x - y = 1 \quad (3 \text{ Marks})$$
- 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;
- $$2a + 4b = 2$$
- $$b - 3a = 11 \quad (3 \text{ Marks})$$
- 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)

- ii) 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;
- i)  $A+B$  (2 Marks)
  - ii)  $AB$  (3 Marks)
- b) The CAT marks for nine students are given as follows: 20, 15, 22, 18, 23,17,14. Calculate
- i) Geometric mean (3 Marks)
  - ii) Harmonic mean (3 Marks)
  - iii) Quartile deviation (4 Marks)
- c) Draw a bar chart to represent the data given below

<b>Bran d</b>	<b>Nike</b>	<b>Jordan</b>	<b>Airforce</b>	<b>Bata</b>	<b>Adidas</b>	<b>Reebok</b>
<b>Sales</b>	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

<b>Marks</b>	10-19	20-29	30-39	40-49	50-59
<b>Frequenc y</b>	5	9	12	10	3

Calculate;

- i) Mean (3 Marks)
  - ii) Median (3 Marks)
  - iii) Mode (3 Marks)
  - iv) 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:
- i) two white marbles (2 Marks)
  - ii) a black then a green marble (3 Marks)
  - iii) no red marble (2 Marks)
- b) If the drawing of marbles is done without replacement, find the probability of drawing;
- i) Two red marbles (2 Marks)
  - ii) A green then a white marble (3 Marks)
- c) Solve using inverse matrix method;

$$5x - 3y = 7$$

$$2x - y = 5 \quad (4 \text{ Marks})$$

- d) 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)

