

**KENYA METHODIST UNIVERSITY**  
**FIRST TRIMESTER EXAMINATION**

**FACULTY** : **SCIENCES**  
**DEPARTMENT** : **MATHEMATICS AND COMPUTER SCIENCE**  
**COURSE CODE** : **MATH 130**  
**COURSE TITLE** : **Basic Statistics**  
**TIME** : **3 HRS**

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**Instructions:** Attempt Question 1 in **Section A** and any other two questions in **Section B**.  
You have been provided with a graph paper and tables.

**SECTION A**  
**QUESTION 1 (30 Mks)**

a) Consider the following subset of real numbers.  
{2, -2,  $\sqrt{2}$ ,  $-8/5$ ,  $\pi$ ,  $\sqrt{-7}$ , 19, 18}.

List the numbers in this set that are

- i) Integers (1Mk)
- ii) Irrational numbers (1Mk)
- iii) Real numbers (1Mk)

b) Evaluate the following expressions given  $x = -2$ ,  $y = 4$ ,  $z = 1/3$ ,  $a = -1$ ,  $b = 1/3$

i) 
$$\frac{3y^2 - 4x}{ax + by} \quad (1Mk)$$

ii) 
$$\frac{y^3}{x^3} - 4\frac{a^2}{b^2} - \frac{xy}{z^2} \quad (1Mk)$$

c) Factorize completely

- i)  $4a^2b^3 - 10a^3b^2 + 8a^4b^3$  (1Mk)
- ii)  $(3 + a)b - (3 + a)c$  (1Mk)
- iii)  $5x^2 + 11x + 2$  (2Mks)
- iv)  $x^3 - 36x$  (1Mk)

d) Solve the equations

i) 
$$\frac{15}{x} - 4 = \frac{6}{x} + 3 \quad (2Mks)$$

ii) 
$$\frac{1}{4-x} = \frac{-6}{x+4} + \frac{2x}{16-x^2} \quad (2Mks)$$

e) Solve the inequalities

i) 
$$\frac{4+x}{-3} \leq \frac{2-3x}{5} \leq \frac{2x-1}{3} \quad (2Mks)$$

ii) 
$$4x + 1 \leq 8x - 2 \leq 12 \quad (2Mks)$$

f) Solve using graphical method (4Mks)

i)  $2x - y = 4$   
 ii)  $x + y = 5$

- g) If the probability of success in a certain event is  $p = 0.6$  and the event is repeated 20 times, find the mean and variance of a success in this activity. **(4Mks)**
- h) Find the following probabilities for standard normal random variable  $z$ .

i)  $P(z > 1.6)$  **(1Mk)**  
 ii)  $P(-2.16 < z \leq 0.55)$  **(3Mks)**

**Section B**

**Question Two: (20 Mks)**

- a) Define the following terms
- i) Population **(1Mk)**  
 ii) Sample **(1Mk)**
- b) A sample of 50 antique dealers in Maasai Market revealed the following sales last month.

Sales (\$thousands)	Number of firms
110	5
130	7
150	9
170	16
190	10
210	3

- i) Estimate the mean sales **(2Mks)**  
 ii) Estimate the median sales. **(2Mks)**

- c) Refer to the following frequency distribution

Class	Frequency
0 – 5	2
5 – 10	7
10 – 15	12
15 - 20	6
20 – 25	3

- i) Estimate the variance. **(4Mks)**  
 ii) Estimate the standard deviation. **(1Mk)**
- d) Describe three limitations of Statistics **(3Mks)**
- e) A bakery makes \$ 1.60 for every cake sold, but loses \$2.70 on every cake not sold as it is thrown away. If 250 cakes are baked every week, how many cakes must be sold each week in order to have a net profit per week of atleast \$200? **(3Mks)**
- f) The sum of two numbers is 37. If the large is divided by the smaller, the quotient is 3 and the remainder is 5. Find the numbers. **(3Mks)**

**Question Three: (20 Mks)**

a) Refer to the following information on sales and advertising expense for the last 4 months.

Month	Advertising Expense (\$Million)	Sales Revenue (\$Million)
July	2	7
August	1	3
September	3	8
October	4	10

- i) Which variable is the independent variable? Which one is the dependent variable? (2 Mks)
- ii) Draw a scatter diagram. (3Mks)
- iii) Determine the coefficient of correlation (5Mks)
- iv) Interpret the strength of the correlation coefficient. (1Mk)
- v) Determine the regression equation. (5Mks)
- vi) Interpret the values of  $\beta_0$  and  $\beta_1$ . (2Mks)
- vii) Estimate sales when 3 million dollars is spent on advertising. (2Mks)

**Question Four: (20 Mks)**

a) If  $A = \{a, e, i, o, u\}$  and  $B = \{a, w, x, i, z\}$

Find

- i)  $A \cup B$  (1Mk)
  - ii)  $A \cap B$  (1Mk)
- b) Consider the experiment of rolling a six – sided die. What is the probability of the event “an even number of spots appear face up?” (2Mks)
- c) What is the probability that a card chosen at random from a standard deck of cards will be either a King or Heart? (3Mks)
- d) A manufacturer of window frames knows that 5% of the production will have some type of minor defect that will require a slight adjustment. Assuming a binomial distribution, what is the probability that in a sample of 4 window frames;
- i) None will need adjustment? (1Mk)
  - ii) Atleast 1 will need adjustment? (2Mks)
  - iii) More than 2 will need adjustment? (2Mks)
- e) A normal population has a mean of 50.0 and a standard deviation of 4.0
- i) Compute the probability of a value between 44.0 and 55.0 (1Mk)
  - ii) Compute the probability of a value greater than 55.0 (2Mks)
  - iii) Compute the probability of a value between 52.0 and 55.0 (3Mks)
  - iv) Determine the value of x below which 95% of the values will occur. (2Mks)