

COURSE CODE : Math 130

COURSE TITLE : Basic Statistics

INSTRUCTIONS

Answer question ONE (Compulsory) and any other TWO questions

Question 1 (30 Marks)

(a) Define the following terms (4 Marks)

- (i). Random sampling
- (ii). Population
- (iii). Sample
- (iv). Nominal measurement

(b) Simplify the following

(i). $\frac{(-2)^5}{2^3} + (2^2)^2 + (4^2)^{1/2}$ (3 Marks)

(ii). $\left(\frac{xy}{z}\right)^4 \cdot \left(\frac{z^4}{x^2}\right)^{1/2}$ (2 Marks)

(c) Solve for x (4 Marks)

(i). $4y + 2x = 7y$

(ii). $\frac{3}{2}x - \frac{2}{3}x = 2$

(d) (i) List two importance of statistics (2 Marks)

(ii) What do you understand by the term statistics? (1 Mark)

(iii) Why is it important to organize data? (1 Mark)

(e) (i) What is a function? (1 Mark)

(ii) State the domain and range of the relation (2 Marks)

$\{(1, -1), (0, 0), (-5, 11), (9, 5)\}$

(iii) State whether the relation in (ii) above is a function or not a function and give a reason for your answer. (2 Marks)

(f) The following data represent the price distribution of some 60 items picked at random from a chemist shop

Price in Ksh.	10-20	20-30	30-40	40-50	50-60
Number of items	4	18	25	10	3

(i). State the modal class (1 Mark)

(ii). Compute the standard deviation (6 Marks)

(iii). Compute the variance (1 Mark)

Question 2 (20 Marks)

(a) John and Jane divided Ksh. 500 amongst themselves. If John had received Ksh. 70 more and Jane had spent Ksh. 30 of his share, they would have equal amounts. How much did they each receive?

(5 Marks)

(b) I am 20 years today. In 10 years time, my brother will be two-thirds my age. How old was my brother 5 years ago?

(3 Marks)

(c) A random sample of 10 sets of corresponding values of X and Y is selected from statistical returns as follows

X	4	17	3	21	10	8	4	9	13	2
Y	13	47	24	41	29	33	28	38	46	14

Calculate

(12 Marks)

(i). The regression line of Y on X

(ii). The correlation coefficient between X and Y

Question 3 (20 Marks)

(a) Solve the inequality

(5 Marks)

$$x^2 + 3x < 10$$

(b) Solve for x

(4 Marks)

$$1 + \frac{8}{x+1} = \frac{2x}{x-1}$$

(c) Solve the quadratic equation by completing the square

(4

Marks)

$$x^2 + 4x - 5 = 0$$

(d) Simplify the expression (2
Marks)

$$\left(\frac{5^2}{2^4}\right)^{1/2} \circ \left(\frac{5}{2^2}\right)^{-1}$$

(e) Solve the system of equations by substitution method (3
Marks)

$$\begin{aligned}x + y &= -\frac{1}{2} \\x + 4y &= 1\end{aligned}$$

(f) Write the following inequality notations as bounded or unbounded interval (2
Marks)

(i). $-1 \leq y < 0$

(ii). $x \geq 10$

Question 4 (20 Marks)

The data below represent the number of outpatients who visited a district hospital in a period of 35 days.

47	68	88	76	84	53	108
155	115	106	95	78	64	92
65	87	55	122	98	86	105
107	66	95	56	105	104	98
87	75	87	77	82	107	82

(a) Classify the data in equal class intervals (5 classes)

(6 Marks)

(b) Create a table with

(6 Marks)

(i) Frequencies

(iii) Equal class boundary

(iv) Mid point values

(c) (i) State the median class

(1 Mark)

(ii) State the modal class

(1 Mark)

(d) Plot a cumulative frequency graph for the data

(2 Marks)

(e) Calculate the mean price of the drugs in the chemist.

(4 Marks)

Formulas to use

$$\text{Regression line, } Y = a + bX ; b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2} \text{ and } a = \frac{\sum y}{n} - b \frac{\sum x}{n}$$

$$\text{Correlation Coefficient} = \frac{n \sum xy - \sum x \sum y}{\sqrt{(n \sum x^2 - (\sum x)^2)(n \sum y^2 - (\sum y)^2)}};$$

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i};$$

$$\text{Standard Deviation, } \delta = \sqrt{\frac{\sum_{i=1}^N (x_i - \bar{x})^2}{N}} \quad \text{or} \quad \delta = \sqrt{\frac{\sum_{i=1}^N f_i (x_i - \bar{x})^2}{N}}$$

$$\text{Variance} = (\delta)^2$$