

COURSE CODE : Math 130

COURSE TITLE : Basic Statistics

INSTRUCTIONS

Answer question ONE (Compulsory) and any other TWO questions

Question 1 (30 Marks)

(a) Differentiate between the following terms (6 Marks)

- (i). Primary and secondary data
- (ii). Discrete and continuous variable
- (iii). Frequency polygon and a histogram

(b) Solve for x (4 Marks)

(i). $2(y + 2x) = 8y - 4$

(ii). $\frac{x}{7} - \frac{2}{3}x = -11$

(c) Simplify the following (6 Marks)

(i). $(2y^4z^4)^{1/2} \times (4yz)^{-2} \times (2xyz)$

(ii). $\frac{(3^3)^2}{(-3)^4} + \frac{9^{1/2}}{3^{-1}} + \left(3^{1/3}\right)^3$

(d) The age of 5 students was recorded as 26, 29, 24, 23 and 28 years. The mean is 26 years. It was however noticed that an error occurred in one of the student's age recorded as 25 years instead of 30 years. What is the correct mean age of the 5 students after the error was corrected?

(3 Marks)

(e) (i) List two measures of dispersion

(2 Marks)

(ii) Why do statisticians often use sampling techniques to obtain information?

(1 Mark)

(f) A man is 39 years old and his son is 15 years. In how many years time will the father be twice as old as the son?

(2 Marks)

(g) The data below represent the performance in a mathematics continuous assessment test of 40 students.

Score in %	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Number of Students	3	9	11	15	2

(i). State the median class

(1 mark)

(ii). Compute the standard deviation

(5 Marks)

Question 2 (20 Marks)

(a) Tim and Pat divided Ksh. 480 amongst themselves. If Tim had received Ksh. 60 more and Pat had spent Ksh. 20 of his share, they would have equal amounts. How much did they each receive?

(4 Marks)

(b) A man is four times as old as his daughter. The difference between their ages is 27 years. What is the man's age?

(2 Marks)

(c) State two data collection sources.

(2 Marks)

(d) A random sample of 11 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	7	2
Y	13	47	24	41	29	33	28	38	46	31	14

Calculate

(12 Marks)

- (i). The regression line of Y on X
- (ii). The correlation coefficient between X and Y

Question 3 (20 Marks)

(e) Tim and Pat divided Ksh. 480 amongst themselves. If Tim had received Ksh. 60 more and Pat had spent Ksh. 20 of his share, they would have equal amounts. How much did they each receive?

(5 Marks)

(f) A man is four times as old as his daughter. The difference between their ages is 27 years. What is the man's age?

(2 Marks)

(g) Solve the inequality

(6 Marks)

$$\frac{x+3}{x^2-1} < 2$$

(h) Solve the quadratic equation

(3 Marks)

$$4x^2 - 9 = 0, \text{ using the quadratic formula, } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(i) Find the domain and range of $\{(2,-5), (0,3), (-3,-3)\}$

(2 Marks)

(j) Which of the following relations are also functions
Marks)

(2

(i). $\{(1, 2), (6,8), (0,8), (7,9)\}$

(ii). $\{(-3, 0), (2, -1), (-3, -5), (4, 4)\}$

Question 4 (20 Marks)

The data below represent the price distribution of some 35 drugs in a chemist selected randomly

45	69	89	75	83	52	109
115	125	108	93	77	63	93
55	88	52	127	99	87	106
100	67	92	57	107	102	97
82	72	84	79	80	108	80

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

(6 Marks)

(b) Create a table with

(8 Marks)

(i) Frequencies

(ii) Cumulative frequency

(iii) Equal class boundary

(iv) Mid point values

(c) Plot a histogram for the data

(2 Marks)

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

(4 Marks)

Formulas to use

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

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

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

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

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