

COURSE CODE : MATH 130
COURSE TITLE : BASIC STATISTICS
INSTRUCTIONS

- Answer Question ONE and any Other TWO Questions

Question 1

- a) Categorize each of the following measurements as nominal, ordinal, interval or ratio
- Rudisha was number one in 800 metre race
 - The man, Khagendra Thapa Margar, boasts of his height of 26.4 inches.
 - Jane is a woman
 - The boiling point of water is 100°C (4Marks)

- b) A man is 39 years old and his son is 15 years. In how many years time will the father be twice the age of his son?
(3Marks)

- c) Express with a rational denominator and simplify $\frac{2 + \sqrt{3}}{2 - \sqrt{3}}$
(3Marks)

- d) A sample of four households is taken. The following table listed the information of their incomes and medical bills for the past one month.

Income in thousands of Ksh (x)	7	11	4	10
Medical Bill in thousands of Ksh. (y)	2	3	1	4

Apply the method of least squares to fit a straight line relationship between x and y and hence estimate the medical bill of the household for which the income is ksh 8,000.

(5Marks)

- e) Differentiate between categorical and numerical data. (2Marks)

- f) Solve the simultaneous equations below by the graphical method

$$3x - y = 7$$

$$2x + y = 3$$

(3Marks)

- g) Solve the equation $3 + \log_2(x-1) = \log_2 30 + \log_2 x - \log_2(x+1)$

(4Marks)

- h) Two judges in a contest, who were asked to rank 8 candidates A, B, C, D, E, F, G and H in order of their medical professional preference, submitted the choices shown in the following table.

	A	B	C	D	E	F	G	H
First Judge	5	2	8	1	4	6	3	7
Second Judge	4	5	7	3	2	8	1	6

Find the coefficient of rank correlation and decide how well the judges agreed in their choices (4Marks)

- i) Describe any two sampling methods (2Marks)

Question 2

- a) The following are heights to the nearest centimeter taken from a sample of 40 students from KEMU University

138 164 150 132 144 125 149 157
146 158 140 147 136 148 152 144
168 126 138 176 163 119 154 165
146 173 142 147 135 153 140 135
161 145 135 142 150 156 145 128

- b) Construct a frequency distribution table with the classes of equal width: 128 – 132, 133 – 137, etc. (5Marks)

- c) Estimate the mode (3Marks)

- d) Using a working mean of 150, estimate the
- i) the absolute mean deviation from the mean (4Marks)
 - ii) mean using a working mean of 150 (4Marks)
 - iii) standard deviation (4Marks)

Question 3

The following table shows the distribution of the number of people in various age groups attending a VCT unit in one month. (For any age x , $20 \leq x < 25$, $25 \leq x < 30$, etc)

Age group	20-25	25-30	30-40	40-60	60-90
No. of people	15	20	14	8	3

- a) Represent this information in a histogram. and draw the corresponding frequency polygon (6Marks)
- b) Using the histogram (or otherwise) estimate the median. (3Marks)
- c) Draw the ogive for this distribution. (5Marks)
- d) Using the ogive (or otherwise) estimate
- The upper quartile (2Marks)
 - The lower quartile (2Marks)
- e) Calculate the quartile deviation (2Marks)

Question 4

The following marks (out of 100) have been obtained by a class of students in statistics.

Paper I (x)	45	55	56	59	60	65	68	71	76	75
Paper II (y)	56	50	50	60	62	64	70	71	75	62

- a) Compute the correlation coefficient of the marks in paper I and paper II and interpret the results (10Marks)
- b) Compute the coefficient of determination and discuss its value (3Marks)
- c) Determine the regression line of y on x (7Marks)

Question 5

a) Solve the simultaneous equations

$$x^2 - y^2 = 20$$

$$2x + y = 16$$

(5Marks)

b) Simplify $\frac{(3^3)^2}{(-3)^4} + \frac{9^{\frac{1}{2}}}{3^{-1}} + \left(\frac{1}{3^3}\right)^3$

(5Marks)

c) If α and β are the roots of $x^2 - 4x + 5 = 0$, find the value of $\frac{1}{\beta} + \frac{1}{\alpha}$

(5Marks)

d) Solve for x given $3^{2x+1} + 3^{2x-1} = 90$

(5Marks)