CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS, COMPUTER SCIENCE, ENGINEERING AND BACHELOR OF EDUCATION SCIENCE

MATH 141: INTRODUCTORY STATISTICS

STREAMS: **TIME: 2 HOURS**

DAY/DATE: THURSDAY 13/04/2023 **11.30 A.M. –1.30 P.M.**

INSTRUCTIONS:
Answer Question ONE and Any other TWO Questions

QUESTION ONE (30 MARKS)

a) The following data represent the ages (in years) of people living in a housing estate in Chuka.

18 31 30 6 16 17 18 43 2 8 32 33 9 18 33 19 21 13 13 14 14 6 52 45 61 23 26 15 14 15 14 27 36 19 37 11 12 11 20 12 39 20 40 69 63 29 64 27 15 28.

Present the above data in a frequency table showing the following; columns, class intervals, class boundaries, class marks (mid-points), tally, frequency and cumulative frequency in that order. (5 marks)

b) In how many different ways can a person gathering data for a market research organization select three of the 20 households living in a certain apartment complex? (3 marks)

c) Highlight three important factors to consider before using secondary data (3 marks)

d) Explain two advantages and two disadvantages of arithmetic mean (4 marks)

e) The table below shows the heights of 70 men randomly selected at Chuka University

Height	118−126	127−135	136−144	145−153	154−162	163−171	172−180
No of rods	8	10	14	18	9	7	4

Compute the median. (4 marks)

g) Given the following data, Compute the;

(i) Mean

(ii) Standard deviation

(iii) Coefficient variation. (7 marks)

Ages (in years)	50 – 54	55 – 59	60 – 64	65 – 69	70 – 74	75 – 79	80 – 84
Frequency	1	2	10	12	18	25	9

h) Obtain the pearson's product moment correlation coefficient of the following data (4 marks)

Mean Temp. (x)	14.2	14.3	14.6	14.9	15.2	15.6	15.9
Pirates (y)	35000	45000	20000	15000	5000	400	17

QUESTION TWO (20 MARKS)

a. State four properties of a good measure of dispersion (4 marks)

b. Students' performance study in a certain university is as summarized in the table below;

Class Boundaries	Frequency
40–45	3
45–50	3
50–55	4
55–60	4
60–65	4
65–70	2
70–75	4
75–80	3
80–85	0
85–90	2
90–95	0
95– 100	0
100–105	1
Total	**30**

Using the data above, calculate; (16 marks)

i. Arithmetic mean

ii. Median

iii. Range

iv. Variance

v. Standard deviation

vi. Coefficient of variation

QUESTION THREE (20 MARKS)

a. Differentiate between Conditional probability and mutually exclusive events, giving an example in each case. (4 marks)

b. In a certain college, 25% of male students and 10% of female students are studying mathematics. The female students constitute 60% of the student body.

i. What is the probability that mathematics is being studied? (3 marks)

ii. If a student is selected at random and is found to be studying mathematics, find the probability that the student is female (2 marks)

iii. If a student is selected at random and is found to be studying mathematics, find the probability that the student is male (2 marks)

c. A box contains 14 transistors, 3 of which are defective. If 3 transistors are selected at random from the box, find the probability of each of the following events.

i. All are defective (2 marks)

ii. None is defective (2 marks)

d. A factory has two machines. Past records show that machine A produces 30 % of the items of output and machine B produces 70% of the items. Further 5% of the items produced by machine A were defective and only 1% produced by machine B were defective. If a defective item is drawn at random, what is the probability that it was produced by machine A? (5 marks)

QUESTION FOUR (20 MARKS)

(a) The table below shows the ages of some husbands (x) and the corresponding ages of their wives(y) at the time of their wedding

Age of husband(x)	22	24	26	26	27	27	28	28	29	30
Age of wife (y)	18	20	20	24	22	27	24	21	25	29

(i) Determine the equation of regression in the form $y = a + bx$ (10 marks)

(ii) Determine the pearson's product moment correlation coefficient (4 marks)

(b) calculate the spearman's rank correlation coefficient between advertisement costs and sales for the data given below (6 marks)

advertisement costs	39	65	62	90	82	75	25	98	36	78
sales	47	53	58	86	62	68	60	91	51	84

QUESTION FIVE (20 MARKS)

a. Newfoundland and Labrador had a "Come Home Year" last year. Many people booked reservations at hotels, especially in the summer months. Below is the number of reservations made for 43 days at a particular hotel in St. John's during Come Home Year.

(12 marks)

49	59	29	76	50	52	94	43	88	26
88	21	55	44	43	19	124	44	45	89
23	61	57	9	86	64	12	38	76	87
38	63	32	44	81	87	25	66	49	99
81	94	20							

i. Construct a frequency distribution table with 7 classes, using the classes 0-20, 20-40 etc

ii. Using your result of i above, draw a histogram and a frequency polygon for the data, on the same set of axes.

iii. Construct a More than Cumulative frequency ogive and a less than ogive on the same of axes.

b. The following data represent the number of calories for a sample of 15 nutritional bars.

(8 marks)

50,65,68,71,72,72,74,75,78,80,84,88,91,91,118

i. Calculate the median, the first ($Q1$), third quartile ($Q3$) and the Interquartile Range.

ii. Calculate the $58th$ -percentile
