

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE (PHYSICS, COMPUTER SCIENCE, APPLIED COMPUTER SCIENCE, ECONOMICS AND STATISTICAL, MATHEMATICS, INDUSTRIAL CHEMISTRY, ELECTRICAL AND ELECTRONICS ENGINEERING, ACTUARIAL SCIENCE), BACHELOR OF EDUCATION (SCIENCE, ARTS), BACHELOR OF ARTS (ECONOMICS AND MATHEMATICS, ECONOMICS AND SOCIOLOGY)

MATH 141: INTRODUCTORY STATISTICS

STREAMS: AS ABOVE

TIME: 2 HOURS

DAY/DATE: MONDAY 29/03/2021

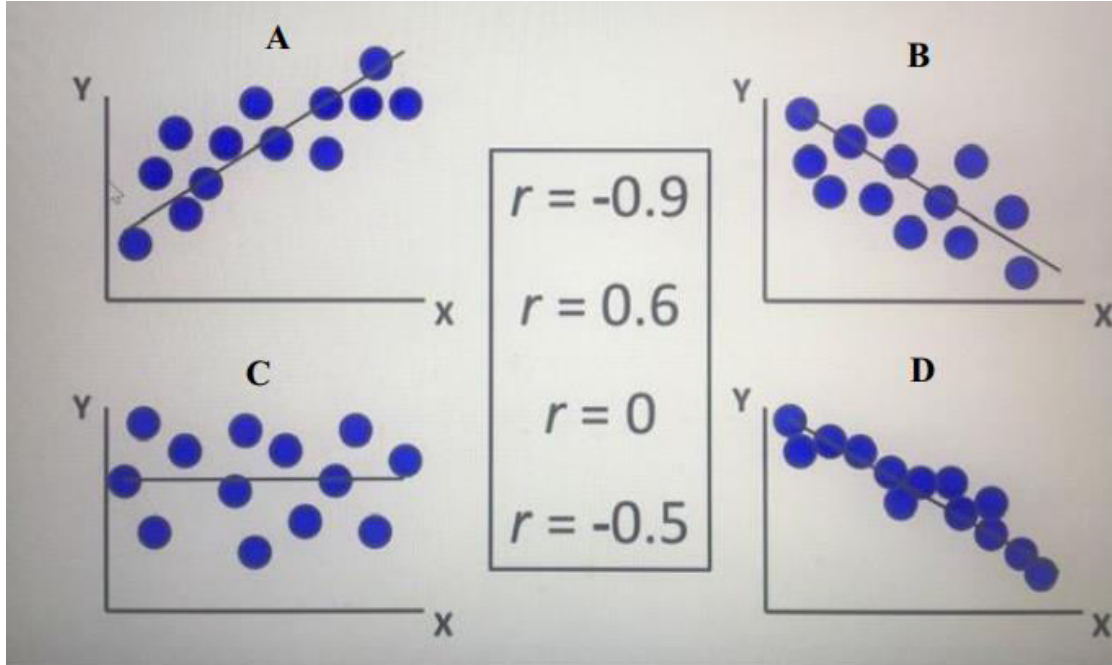
2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

- **Answer question one and any other two questions**
- **All workings must be shown clearly**

QUESTION ONE

- (a) Define the term statistics [1 mark]
- (b) Differentiate the following terms
- (i) Statistic and parameter [2 marks]
 - (ii) Skewness and kurtosis [2 marks]
 - (iii) Mutually exclusive and independent events [2 marks]
 - (iv) Correlation and regression [2 marks]
- c) Consider the diagrams below and match r to the most appropriate scatter plot



d) The data below represents the mass (in kilograms) of 50 students

Mass (Kg)	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No of Students	4	5	8	13	10	6	4

Calculate

- (i) Mode [2 marks]
 - (ii) Median [3 marks]
 - (iii) Mean [2 marks]
 - (iv) Standard deviation [3 marks]
- e) A box contains 3 red balls and 6 green balls. 3 balls are to be picked one after the other without replacement. Find the probability that;
- i). Three balls picked are of the same color [3 marks]
 - ii). At least 2 balls picked are green [3 marks]
 - iii). Only one ball is red [2 marks]

QUESTION TWO

a) Two fair dice are tossed and the following events are defined.
 $A = \{\text{sum of the numbers showing is odd}\}$, $B = \{\text{sum of the numbers showing is 9, 11 \& 12}\}$
 Are the events A & B independent? Why? Show your working. [4marks]

(b) Two events E and F are such that $P(E) = 0.7$, $P(F) = 0.6$ and $P(E \cup F) = 0.8$ Find
 (i) $P(E \cap F)$ [3marks]

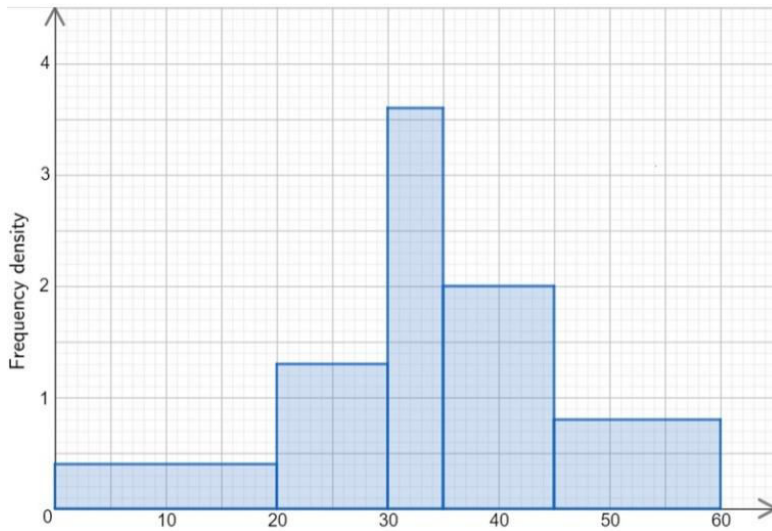
- (ii) $P(E^c \cap F)$
- (iii) $P(E^c \cap F^c)$

[2marks]
[2marks]

c) Ms P and Mr Q visit clients to make sales for their company. In one month, Ms P visits 60% of all the company’s clients and Mr Q visits all the others. Past records show that on each visit Mr Q has an 80% likelihood of making a sale, while for Ms P there is a 70% likelihood of making a sale.

- i. Draw a probability tree diagram to represent this situation. [3 marks]
- ii. Calculate the probability that a sale is made during the month. [3 marks]
- iii. If a sale is made, find the probability it was made by Ms P. [3 marks]

QUESTION THREE



In the graph above, the horizontal axis shows the duration (in minutes) of telephone calls to a technical support helpline of a software house.

- (a) Is this graph a bar chart or a histogram? [1 mark]
- (b) Give two reasons to justify your answer to (a) [2 marks]
- (c) How many calls lasted between 30 and 35 minutes? [1 marks]
- (d) Use the graph to complete the frequency distribution below [3 marks]

Duration of call (minutes)	Frequency (f)
Above 0 up to 20	
20 up to 30	
30 up to 35	

35 up to 45	
45 up to 60	
Total $\sum f =$	

- (e) What call duration is the modal class for this data? [1 mark]
- (f) Use your results from (e) to calculate the 5th decile, 80th percentile and quartile deviation [9 marks]
- (g) State whether each of these statements is true or false:
- (i) The diagram illustrates continuous data
 - (ii) Histograms may be used to illustrate discrete data
 - (iii) A person's age is normally stated as discrete data [3 marks]

QUESTION FOUR

- a) The following data show the number of weekly reported crimes in a certain police station

81 75 59 77 35 74 43 67 43 46 74 65
 59 64 55 45 25 44 46 48 33 68 46 98
 58 5 45 53 19 29 45 55 28 11 83 40
 38 35 44 52 21 57 14 35 59 77 31 28
 39 52 67 47 49 43 41 45 65 55 62 3

- (i) Construct a frequency table using 0-9, 10-19, ... as the class intervals [2 marks]
- (ii) From the frequency distribution obtained in (i), construct a histogram and a frequency polygon on the same [3 marks]

- b) The following are weights and heights of a group of seven students taking probability and statistics course.

Weight	X	56	60	62	65	70	80	90
Height	Y	138	148	150	156	153	160	173

- i) Develop the least squares estimate regression equation that relates the height to the weight
- ii) Predict the height when the weight is 58 kg
- iii) Compute the coefficient of determination and Pearson's moment correlation coefficient and interpret your values

[15 marks]

QUESTION FIVE

a) In a certain college, 35% of the boys and 15% of the 60 girls are studying Physics. The girls constitute 55% of the student's body. If a student is picked at random and is studying Physics, determine the probability that the student is a girl. [4 Marks]

b) Calculate the rank correlation coefficient for the following data on two tests and Comment on the correlation between A and B.

Country	I	II	III	IV	V	VI	VII
A	5.8	5.5	5.9	4.9	5.9	5.6	5.0
B	5.5	5.4	5.8	5.3	5.7	5.7	5.7

[6 marks]

c) Consider the following data

Class Interval	Frequency
90-99	5
100-109	8
110-119	22
120-129	27
130-139	17
140-149	9
150-159	5
160-169	5
170-179	2

Required: Compute,

- i. the absolute mean deviation [4 marks]
- ii. quartile deviation [4 marks]
- iii. the seventh decile [3 marks]
- iv. the 85th percentile [3 marks]