CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS
CHUKA / EMBU/THARAKA

EXAMINATION FOR THE AWARD OF
BACHELOR OF SCIENCE IN ECONOMICS& STATISTICS, MATHEMATICS, CHEMISTRY, ACTUARIAL SCIENCE, INDUSTRIAL CHEMISTRY, COMPUTER SCIENCE, APPLIED COMPUTER SCIENCE, ELECTRICAL AND ELECTRONICS ENGINEERING, ECONOMICS & MATHEMATICS, ECONOMICS AND SOCIOLOGY, PHYSICS, BACHELOR OF EDUCATION SCIENCE (ARTS)

MATH 141: INTRODUCTORY STATISTICS

STREAMS: AS ABOVE   **TIME: 2 HOURS**

DAY/DATE: MONDAY   20/04/2020   **11.30 A.M - 1.30 P.M.**

INSTRUCTIONS:
- Answer Question **One** and any other **Two** questions.

QUESTION ONE   (30 MARKS)

1(a) Define the following terms.

 (i) Population

 (ii) Sample

 (iii) Parameter

 (iv) A statistic

 (v) Inferential Statistics

(b) The number of passengers in each of 120 randomly observed vehicles during morning rush hour was recorded with the following results.

X	1	2	3	4	5
f	84	29	3	3	1

    (i)   Calculate the mean of this data set.
    (ii)   State two disadvantages of the mean as a measure of central tendency. [2 Marks]

(c) The IQ scores of ten students randomly selected from a class for academically gifted students are given,

      133   140   152   142   137

      145   160   138   139   138

Construct a stem and leaf diagram for the data.   [3 Marks]

(d) A box contains 8 red, 8 yellow and 8 green marbles. Two marbles are drawn randomly from the box in succession without replacement and the colour noted each time.

(i) Construct a sample space for the experiment.   [1 Mark]

(ii) Find the probability that,

    (a) No yellow Marble is drawn   [2 Marks]

    (b) The two marbles drawn have the same colour.   [2 Marks]

    (c) At least one marble of each colour is drawn.   [1 Mark]

(e) In an area of the country, records were kept on the relationship between the annual rainfall (in inches) and the yield wheat (brushels per acre).

Rain (inches)	10.5	8.8	13.4	12.5	18.8	10.3	7.0	15.6	16.0
Yield (brushels /acre	50.5	46.2	58.8	59.0	82.4	49.2	31.9	76.0	78.8

(i)   Fit a least square regression equation of rain(inchas) on yield (bushels / acre).

[6 Marks]

(ii)   If the yield is 62.5 bushels per acre, determine the annual rainfall (in inches).

[2Marks]

(f) (i) State Baye's Theorem.   [1 Mark]

(ii) A box of cartridges contains 30 cartridges of which 6 are defective. If 3 of the cartridges are removed from the box in succession without replacement. What is the probability that all the 3 cartridges are defective ?

QUESTION TWO   (20 MARKS)

2(a) The table below shows the distribution of marks scored by 40 students in a mathematics course.

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	3	4	2	5	8	11	2	1	3	1

(i)   Use 45.5 as the assumed mean to calculate
       (a) The mean mark   [4 Marks]

       (b) The Standard deviation   [3 Marks]

(ii)   Calculate the mode of the distribution of marks.   [4 Marks]

(iii) Calculate the first quartile (Q_1) for the data.   [2 Marks]

(iv)   Calculate the third quartile (Q_3) for the data.   [1 Mark]

(v)   Find the inter quartile range for the data.   [1 Mark]

(b) Explain various scales of measurements.   [4 Marks]

QUESTION THREE   (20 MARKS)

3. The following data shows unit price for particular commodities in relation to demand.

Unit price (X)	Demand (Y)
25	430
28	460
35	490
32	410
31	360
36	320
29	310
38	300
34	330
32	390

(i)   Fit a simple linear regression equation.   [8 Marks]

(ii)   Estimate the unit price when the demand is 300 units.   [2 Marks]

(iii)   Calculate the pearsons correlation coefficient of the data and comment on your
results.   [7 Marks]

(iv)   Calculate the coefficient of determination.   [3 Marks]

QUESTION FOUR   (20 MARKS)

4(a) The two data sets shown below are masses in kg of persons who visited two different hospitals.

Set A: 40.5   43.5   48.5   49.5   40.5   41.5   56.5

  59.5   61.0   63.5

Set B: 38.0   49.0   51.5   53.4   42.5   48.5   50.0

  62.5   67.01   69.0   5.11   2.10

Calculate:

  (i)   Combined mean for the data.   [4 Marks]

  (ii)   Combined variance for the data   [6 Marks]

(b) State 5 (five) properties of a good measure of dispersion.   [5 Marks]

(c) Study the data in the table below of the distance of a store and the price of the product.

Store	Distance (M)	Price (SH)
1	50	180
2	175	125
3	250	200
4	375	100
5	425	110
6	585	120
7	720	80
8	810	60
9	875	105
10	950	85

  (i)   From the data calculate the Spearman's rank correlation coefficient between distance and price of the product.   [4 Marks]

  (ii)   Comment on your results in 4 C (i) above.   [1 Mark]

QUESTION FIVE   **(20MARKS)**

5(a) From a bag containing 4 white and 6 black balls, two balls are drawn at random, if the balls are drawn one after the other without replacement, find the probability that;

     (i)   Both are white   [2 Marks]

     (ii)   None is white   [2 Marks]

     (iii)   At least one is white   [2 Marks]

     (iv)   The first ball is white and the second is black.   [2 Marks]

(b) Twelve male and 16 female students have been selected as equal qualifiers for 6 college scholarships. If the awarded recipients are to be chosen at random, what is the probability that 3 will be male and 3 will be female?   [4 Marks]

(c) In a bolt factory machines A, B and C manufactures respectively 25%, 35%, 40%, of the total of their output 5%, 4% and 2 % are defective bolts. A bolt is drawn from a day's production and found to be defective. What is the probability that it was manufactured by machine C.

                                                 [5 Marks]

(d) At Chuka University, there are 15 names on the ballot for nominations to represent students affairs. Five will be selected to form a team. If there are 8 ladies and 7 gentlemen on the ballot, what is the probability that team of 2 gentlemen and 3 ladies is formed ?   [3 Marks]

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