

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2016/2017**

**SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY**

**STA 2100: PROBABILITY AND STATISTICS I**

**DATE: APRIL 2017 TIME: 2 HOURS**

**INSTRUCTIONS: Answer question one and any other two.**

QUESTION ONE (30 MARKS) COMPULSORY

a. Define the following terms;

i. Random variable

ii. Correlation

iii. Coefficient of determination. (6 marks)

b. The relationship between expenditure on welfare services and absenteeism for similar periods of time is shown below for a small company.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Expenditure | 3.5 | 5.0 | 7.0 | 10 | 12 | 15 | 19 |
| Days lost | 241 | 318 | 174 | 110 | 147 | 122 | 86 |

calculate spearman’s rank correlation and comment on its value

c. The highest temperature for the selected cities are shown

32,19,57,48,44,50,42,49,53,46, find

i. Range (2 marks)

ii. The standard deviation. (5 marks)

d. Given the following frequency distribution

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Group | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
| Frequency | 20 | 25 | 36 | 72 | 51 | 4 |

Calculate the harmonic mean. (5 marks)

e. A total of 28% of males living in old Town smoke cigarettes, 6% cigars and 3% smoke both cigar and cigarettes. What percentage of males smoke neither cigars nor cigarettes? (4 marks)

QUESTION TWO (20 MARKS)

The following data relate to advertising expenditures (ksh ‘000’)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| And their corresponding sale (ksh ‘000,000) | | | | | |
| Advertising expenditure | 10 | 12 | 15 | 23 | 20 |
| sales | 14 | 17 | 23 | 25 | 21 |

a. Draw a scatter diagram and interpret your diagram. (3 marks)

b. Determine the peasm correlation coefficient between the expenditure and sales.

(7 marks)

c. Fit a simple linear regression model between expenditure and sales. (6 marks)

d. Predict

i Sales corresponding to expenditure of ksh 300000. (3 marks)

ii. Expenditure for sales target of ksh 35000000. (2 marks)

QUESTION THREE (20 MARKS)

The following distribution represents the length of a particular rare fish caught in the Indian ocean in a particular month.

|  |  |
| --- | --- |
| Length (mm) | Frequency |
| 118-126 | 3 |
| 127-135 | 5 |
| 136-144 | 9 |
| 145-153 | 12 |
| 154-162 | 5 |
| 163-171 | 4 |
| 172-180 | 2 |

From the distribution above, calculate the following measures.

i. Mean (4 marks)

ii. Mode (3 marks)

iii. Median. (3 marks)

iv. Standard deviation. (5 marks)

v. Coefficient of variation. (2 marks)

vi. Pearson skewness coefficient (3 marks)

QUESTION FOUR (20 MARKS)

In a survey, it was found that 64 families bought milk in the following quantities in a particular month.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 19 | 16 | 22 | 9 | 22 | 12 | 39 | 19 | 14 | 23 | 6 | 24 | 16 | 18 | 7 | 17 |
| 20 | 25 | 28 | 18 | 10 | 24 | 20 | 21 | 10 | 7 | 18 | 28 | 24 | 20 | 14 | 23 |
| 25 | 34 | 22 | 5 | 33 | 23 | 26 | 29 | 13 | 36 | 11 | 26 | 11 | 37 | 30 | 13 |
| 8 | 15 | 22 | 21 | 32 | 21 | 31 | 17 | 16 | 23 | 12 | 9 | 15 | 27 | 17 | 21 |

You are required to:

a. Form a frequency distribution table with inclusive class intervals of magnitude 5 and the first class starting with 5-9. (5 marks)

b. Draw a histogram from the distribution. (5 marks)

c. Draw a cumulative frequency distribution and use it to determine:

i. First quartile (2 marks)

ii. Second quartile. (2 marks)

iii. Third quartile (2 marks)

iv. Quartile deviation. (1 mark

v. 75th percentile. (3 marks)

QUESTION FIVE (20 MARKS)

a. The probability that a train arrive on time at terminus 4 is 5/6 , while the probability that a train arrives on time at terminus B is 3/4 . Fro the two trains selected at random from each system find;

i. The probability that they both arrive on time. (3 marks)

ii. The probability that only one of the them arrives on time. (3 marks)

iii. The probability that neither arrives on time. (3 marks)

b. Among 400 inmates of a prison, some are first offenders, some are hardened criminals, some serve terms of less than five years and some serve longer terms with exact breakdown being.

|  |  |  |
| --- | --- | --- |
|  | Less than five year term | Longer term |
| First offenders | 120 | 40 |
| Hardened criminals | 80 | 160 |

If one of the inmates is to be selected at random to be interviewed about prison conditions, let H denote hardened criminal and L denote serving a longer term. Determine:

i. P(H) (1 mark)

ii. P(L) (1 mark)

iii. P(LnH) (2 marks)

iv. P(H’n L) (2 marks)

v. P(L|H) (3 marks)

vi. P(H’|L) (3 marks)