



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

MAIN EXAMINATION

MAY – JULY 2016 TRIMESTER

FACULTY OF COMMERCE

MBA CITY CAMPUS / EVENING / PROGRAMME

CMS 510: MANAGERIAL STATISTICS

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Date: JULY 2015

Duration: 3 Hours

INSTRUCTIONS: Answer ALL Questions

- Q1. a) One of key functions of descriptive statistics is to determine numerical measures that 'condense' and summarize a complete set of data which managers make valuable use of when preparing reports and presentations at work place. State FOUR categories of numerical measures. **(2 marks)**
- b) The following table gives distribution of long distance telephone bills in Kenya shillings

| Class limit (kshs) | Frequency | Relative frequency | Cumulative relative frequency |
|--------------------|-----------|--------------------|-------------------------------|
| 0 - 1275 | 71 | | |
| 1275 - 2550 | 37 | | |
| 2550 - 3825 | 13 | | |
| 3825 - 5100 | 9 | | |
| 5100 - 6375 | 10 | | |
| 6375 - 7650 | 18 | | |
| 7650 - 8925 | 28 | | |
| 8925 - 10200 | 14 | | |
| Total | 200 | | |

Required to

1. Draw a histogram of the distribution and state its shape. **(1 mark)**
2. Complete the table **(2 marks)**

3. Determine the percentage of this bills that less than or equal to kshs 7,650. **(1 mark)**
- c) In interpreting the standard deviation
1. Explain briefly the empirical rate **(1 mark)**
 2. The annual salaries of the employees of a chain of computer stores produced a positively skewed histogram. The mean and standard deviation are kshs 2,380,000 and kshs 255,000 respectively. What can you say about the salaries at this chain? **(1 ½ marks)**
- d) Explain briefly the following terms
- i Box plots **(1 mark)**
 - ii Least squares method **(1 mark)**
 - iii Coefficient of determination **(1 mark)**
- e) Peter is a tool generator producing specialized tools using electricity. The more tools Peter produces daily the higher the electricity cost he has. From the daily data on the number of tools and electricity cost, Peter calculated the coefficient of correlation of 0.8435.

Required

- i Calculate the coefficient of determination **(1 ½ marks)**
 - ii Interpret the results in (i) above. **(1 ½ marks)**
- Q2. a) i In sampling explain briefly the following terms
- I Response rate **(1 mark)**
 - li Sampling frame **(1 mark)**
 - lii Sampling error **(1 mark)**
- ii Determine the sample size given
 $\sigma = 6$, population standard deviation
 $\mu = 25$ population mean
 $\bar{X} = 23$ sample mean
 $Z = 2.576$ level of precision **(1 mark)**
- b) I In probability distributions explain briefly the following terms
- i Random variable **(1 mark)**
 - ii Probability distribution **(1 mark)**
- II The statistical abstract of a hypothetical National Bureau of statistics provided the following summary data on the number of color TVs in the household.

| Number of color TVs | Number of household('000') |
|---------------------|----------------------------|
| 0 | 1,218 |
| 1 | 32,379 |
| 2 | 37,961 |
| 3 | 19,387 |
| 4 | 7,714 |
| 5 | 2,842 |
| Total | 101,501 |

Required to

- I Develop the probability distribution of the number of color TVs per household. **(1 mark)**
 - ii Calculate the probability that a randomly selected household owns three or more color TVs. **(2 marks)**
- c) The monthly sales at Maktech computers limited have a mean kshs 2,125,000 and standard deviation of kshs 340,000. Profits are calculated by multiplying sales by 30% and subtracting fixed costs of kshs 510,000. Describe the population of monthly profits. **(3 marks)**
- Q2. Explain briefly the following terms
- I Sampling distribution **(2 marks)**
 - II Finite population correlation factor **(1 mark)**
- Q3. a) In a milk processing plant, the amount of milk in each 32 ounce packet is normally distributed with mean = 32.2 ounces and standard deviation = 0.3 ounce if a customer buys
- I One packet what is the probability that the bottle will contain more than 32 ounces **(2 marks)**
 - ii One carton of 4 packets what is the probability that the mean amount of the 4 packets will be greater than 32 ounces. **(3 marks)**
- b) Explain briefly
- i The importance of the analysis of variance technique **(2 marks)**
 - ii The requirements for probability distribution of discrete random variable. **(2 marks)**
- c) Distinguish clearly between the following terms
- i Goodness – of – fit test **(1 ½ marks)**
 - ii Contingency tables test **(1 ½ marks)**

d) Company A has recently conducted aggressive advertising campaigns to maintain and possibly increase its shares of the market for fabric softener. Their competitor company B has 40% of the market and a number of other competition account for the remaining 15%. To determine whether the market shares changes after the advertising campaigns the marketing manager for company A solicited preferences of a random sample of 200 customers of fabric softener of the 200 customers 102 indicated a preference for a company A's product 82 preferred company B's fabric softener and the remaining 16 preferred the products of one of the competitors. Can the analyst infer at 5% level of significance that customer preferences have changed from their units before the advertising campaigns were launched? **(3 marks)**

Q4. a) Explain briefly the critical concepts of hypotheses testing **(5 marks)**

b) Explain briefly the term 'width of the confidence interval' **(3 marks)**

c) In a one-way analysis of variance with R populations
 i State the hypotheses to be tested **(1 ½ marks)**
 ii Indicate clearly the sources of variation **(1 ½ marks)**

d) A student organization surveyed both recent graduands and current students to obtain information o the quality of teaching at a particular university. An analysis of the responses provided the following teaching ability rankings.

| Professor | Ranking By | |
|-----------|------------------|------------------|
| | Current students | Recent graduands |
| 1 | 4 | 6 |
| 2 | 6 | 8 |
| 3 | 8 | 5 |
| 4 | 3 | 1 |
| 5 | 1 | 2 |
| 6 | 2 | 3 |
| 7 | 5 | 7 |
| 8 | 10 | 9 |
| 9 | 7 | 4 |
| 10 | 9 | 10 |

Required to

- i Do the rankings given by the current students agree with the rankings given by the recent graduands. **(1 ½ marks)**
 ii Use $\alpha = 0.10$ and test for a significant rank correlation. **(1 ½ marks)**

END