



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

MAY – JULY 2019 TRIMESTER

FACULTY OF COMMERCE

SPECIAL / SUPPLEMENTARY EXAMINATION

CMS 510: MANAGERIAL STATISTICS

Date: JULY 2019

Duration: 3 Hours

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

Q1.

- a. Explain briefly the following:-
 - i. Three (3) characteristics of the normal distribution **(3 marks)**.
 - ii. the width of the confidence interval estimator **(3 marks)**
- b. Babu is a student taking statistics course. Babu regularly misses classes and intends to rely on luck to pass the next quiz. The quiz consists of ten (10) multiple-choice questions. Each question has five (5) possible answers, only one of which is correct. Babu plans to guess the answer to each question. What is the probability that Babu gets no answer correct? **(2 marks)**
- c. Compute the probability of obtaining a z-value between 1.00 and 1.58. Illustrate your answer appropriately **(1 ½ marks)**.
- d. The foreman of a bottling plant observed that the amount of soda in each 32-ounce bottle is a normally distributed random variable with mean, $\mu = 32.2$ ounces, and standard deviation, $\sigma = 0.3$ ounce if a customer buys:
 - i. One bottle, find the probability that the bottle will contain more than 32 ounces. Illustrate your answer appropriately **(1 ½ marks)**.
 - ii. A carton of four (4) bottles, find the probability that the mean amount of the 4 bottles will be greater than 32 ounces. Illustrate your answer appropriately **(2 marks)**.
- e. A company wants to determine whether individuals who were expected at the time of employment to be better salespersons actually turn out to have better sales record. The following table shows the relevant data and the two (2) rankings.

Sales person	Ranking of potential	Actual sales (units)	Ranking of actual
1	2	400	1
2	4	360	3
3	7	300	5
4	1	295	6
5	6	280	7
6	3	350	4
7	10	200	10
8	9	260	8
9	8	220	9
10	5	385	2

The statistical concern is whether there is agreement between the ranking potential and the ranking of actual sales performance. Explain **(2 marks)**.

Q2.

- Explain briefly the statements 'statistics discipline can broadly be divided into two divisions' (2 marks).
- Explain briefly three (3) major categories of descriptive techniques and methods (3 marks).
- Inferential statistics is the process of reaching generalizations about the population by examining the sample. Conclusions and estimates about the population on the basis of the sample are not always going to be correct. Explain briefly two measures of reliability built into the statistical inference (2 marks).
- Explain briefly the two most important characteristics of a linear relationship. Illustrate your answer (3 marks).
- Using suitable illustration, explain briefly the measures of distribution shape (3 marks).
- The monthly mean (μ) and standard deviation (σ) of sales for Inuka Industries Ltd is Kshs25,000 and Kshs3,000, respectively. The sales record on a particular day were 1.2 standard deviations above the mean. Find x (2 marks).

Q3.

- Explain briefly the desirable qualities of an estimator (3 marks).
- macTec Solutions makes its own computers and delivers them directly to customers. It competes primarily on price and speed of delivery and generally takes one (1) day to deliver a computer to the customer from the warehouses across the country. To cover inventory costs, the operation manager wants to use an inventory model. He notes that daily demand (x) during lead time is normally distributed and wants to know the mean to compute the optimum inventory level. The sum of demand for 25 lead time periods is:

$$\sum_{i=1}^{25} x_i = 9,254$$

From experience, the manager knows that the standard deviation, σ , is 75 computers. Find a 95% confidence interval estimate of the mean demand during lead time (3 marks).

- c. Explain briefly the term 'test statistic' (2 marks).
- d. After a thorough financial analysis, the manager of a department store establishes that a new billing system for stores' credit customers will cost effective only if the mean monthly credit is more than \$170. A random sample of 400 monthly credit accounts is drawn for which the sample mean is \$178. The manager knows that the credit accounts are normally distributed with a standard deviation, $\sigma = \$65$.

Required to

- i. Set appropriate hypotheses (2 marks).
- ii. Given the level of significance, $\alpha = 5\%$, can the manager conclude that the new system will be cost-effective? (2 marks).
- e. Explain briefly two important applications of the inference about the variance (3 marks).

Q4.

- a. Distinguish between the rejection region method (or critical value approach) and the p-value approach in which decisions pertaining to test hypotheses can be reached **(3 marks)**.
- b. Using suitable illustration as applicable, explain briefly the following:-
- The union of two events and **(1 mark)**.
 - The intersection of two events **(1 mark)**.
 - Mutually exclusive events **(1 mark)**.
 - Independent events **(1 mark)**.
- c. A financial analyst randomly sampled 366 Kenyan households and asked each to report the age of the head of the household and the proportion of their financial assets that are invested in the stock market. The following table presents results of four (4) age categories in terms of sample size, sample mean, and sample variance.

Sample size (n_i)	Sample mean (\bar{x}_i)	Sample variance (σ^2_i)
$n_1 = 84$	$\bar{x}_1 = 44.40$	$\sigma^2_1 = 386.55$
$n_2 = 131$	$\bar{x}_2 = 52.47$	$\sigma^2_2 = 469.44$
$n_3 = 93$	$\bar{x}_3 = 51.14$	$\sigma^2_3 = 471.82$
$n_4 = 58$	$\bar{x}_4 = 51.84$	$\sigma^2_4 = 444.79$
	$\bar{\bar{x}} = 51.18$ (grand mean)	

The concern of the financial analyst is to compare the four (4) population means or age categories. Required to:

- i. Set the test hypotheses **(1 mark)**.
 - ii. Calculate the mean square for treatment **(1 mark)**.
 - iii. Calculate the mean square for error **(1 mark)**.
 - iv. Calculate the test statistic for the test hypotheses **(1 mark)**.
- d. The real estate agent knows that the cost of building a new house is about Kshs5,000 per square foot (X) and that most land plots sell for about Kshs1,000,000. If Y is the selling price of houses, required to:
- i. Write the equation to predict the price of houses **(1 mark)**.
 - ii. Find the estimate of the selling price of a house of 2,000sq.ft **(1 mark)**.
- e. Statistical inference about the variance can be used to make decisions in a variety of real life situations. Briefly explain two (2) such situations **(2 marks)**

END