



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

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MAY – AUGUST 2021

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FACULTY OF ARTS AND SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

REGULAR PROGRAMME

ECN 301 – ECONOMIC STATISTICS I

Date: AUGUST 2021

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

Q1.

- a) Discuss the concept of the expected value of a random variable **(4 marks)**
- b) Sales person for widgets make a sale to 15% of the customers on whom they call. If a member of the sales calls on 15 customers today, what is the probability that he/she will sell,
- i. exactly two widgets **(3 Marks)**
- ii. at most two widgets **(3 Marks)**
- iii. at least three widgets **(3 marks)**
- c) A claim is made that the average income of a company is shs. 26,500 with a standard deviation of shs. 8,750. A sample of 100 employees was picked and their mean income found to be 24,510. Questions were raised why a sample with a mean of 24,510 would be found from a population with a mean income of 26,000. Assess the likelihood of getting a sample mean as low as or lower than 24,510 if the population mean is indeed 26,000 **(6 marks)**
- d) A producer wishes to determine the mean daily output level for his products. He selects a sample of 100 days and determines a mean daily output of 112 tons. Past experience has shown that the population standard deviation in output is 50 tons. Determine the interval in which the man lies at 95% level of confidence,

Explain. (5 marks)

- e) Explain the four characteristics of good estimators (4 marks)
- f) Explain two forms of hypothesis (2 marks)

Q2.

- a) The Federal Housing Administration (FHA) estimated the mean mortgage rate for savings and loan institutions across the nation. A sample of 100 institutions was taken under the assumption that rates were normally distributed. A mean and standard deviation of 10.3% and 2.1% were calculated respectively. The FHA wanted to be extremely confident of their findings and chose $\alpha = 0.01$. Construct and explain the confidence interval (6 marks)
- b) Jim owns a curio shop in down town; inventory records suggest a particular curio blend is quite popular. Data indicate that on the average, other curio shops sell an average of 12.2 pounds per day of that blend. Jim in an attempt to find out how his sales compare with this average, takes a sample of his sales over 200 days and finds a mean of 14.3 pounds, with a standard deviation of 2.7 pounds. Jim does not know if daily sales are normally distributed. What does a 90% Confidence Interval reveal about Jim's average sales compared with other curio shops? (8 marks)
- c) A construction firm was charged with inflating the expense vouchers it files in conjunction with construction contracts with the government. The contract states that a certain type of Job should average \$ 1,150. In the interest of time, the directors of only 12 government agencies were called on to enter the court testimony regarding the firm's vouchers. If a mean of \$1275 and a standard deviation of \$ 235 are discovered from the testimony, would a 95%. Confidence Interval support the firm's legal case? Assume voucher amounts are normal (6 marks)

Q3.

- a) State four properties of the standard normal distribution (4 Marks)
- b) Explain the steps in hypothesis testing (8 marks)
- c) In an opinion survey regarding a certain political issue there was some question as to whether or not the eligible voters under 25 years of age might view the

issue differently from those over 25 years. 1500 individuals of those over 25 years were interviewed and 1000 of those under 25 years were interviewed with the following results

	Opposed	Undecided	Favour	Total
Under 25	400	100	500	1000
Over 25	600	400	500	1500
Total	1000	500	1000	2500

Test the null hypothesis that there is no evidence of difference of opinion due to the Different age grouping; take $\alpha = 0.05$ **(10 Marks)**

Q4.

- a) A sample of 600 manufacturing processes yielded a mean of 7.2 days. Times are normally distributed with a standard deviation of 1.9 days. Calculate a 95% confidence interval for mean completion time for the process **(8 marks)**
- b) You are provided with the following data for Madison Furniture Company on sales (Y) and the advertising (X).

Sales (Y) (\$'000')	Advertising (X) (\$'000')
22	0.8
28	1.0
22	1.6
26	2.0
34	2.2
18	2.6
30	3.0
38	3.0

30	4.0
40	4.0
50	4.0
46	4.6

- i. Determine the correlation coefficient between sales and advertisements and interpret your answer **(6 marks)**
- ii. Estimate the regression model between sales and advertising. How much sales would the company make by spending \$5000 on advertising? **(6 marks)**

Q5.

- a) An institution wants its entire staff to be computer literate. Three institutions A, B and C are available. From past experience, 14 people who underwent training from the institutions were evaluated as follows: -

A	3	4	2	4	2
B	4	5	4	6	
C	6	6	6	4	3

- i) State the appropriate null and alternative hypothesis for determining whether a difference exists in the training offered. **(4 Marks)**
 - ii) Construct the relevant ANOVA table and test the null hypothesis at $\alpha = 0.05$ **(8 Marks)**
- a) A travel agent claims that the daily amount of sun shine in a given holiday during the peak season is 7 hrs. The holiday maker who booked the holiday found that 30 day holiday gave an average of 5.9 hrs of sunshine a day and a standard deviation of 1.8 hrs. If the daily amount of sunshine is normally distributed, do you think that the holiday maker has reason to believe that the agent has been misleading? Use $\alpha=0.02$ **(8 marks)**

END