

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF
COMMERCE

BCOM 466: ADVANCED STATISTICS

STREAMS: BCOM

TIME: 2 HOURS

DAY/DATE: MONDAY 27/09/2021

8.30 A.M. – 10.30 A.M.

Question one

- a) Explain importance of forecasting in business (5 marks)
- b) Explain the role of inspection in statistical quality control. (3 marks)
- c) Below are figures of production in (m.tonnes) in a certain dairy firm.

| Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|------------|------|------|------|------|------|------|------|
| Production | 80 | 80 | 92 | 83 | 94 | 99 | 92 |

Required:

- i) Fit a straight line trend to these figures using a method at least squares. (6 marks)
- ii) Estimate the likely sales for the firm for the year 2021. (2 marks)
- d) Discuss 6 assumptions of linear multiple regression analysis. (6 marks)
- e) 20 television sets were examined for quality control test. The number of defects for each television set are recorded below:

2,4,3,1,1,2,5,3,6,7,3,1,4,2,1,3,4,6,1,1

Required

- i. Prepare a c-chart. (6 marks)
- ii. What conclusions can you draw from it (2 marks)

Question two

- a) In a survey of buying habits, 400 women shoppers are chosen at random in a supermarket A. Their average weekly food expenditure is Ksh. 220 with a standard deviation of Ksh. 40. For another group of 400 women shoppers chosen at random in supermarket B located in another area of the same city, the average weekly food expenditure is Ksh. 220 with a standard deviation of Ksh. 53.

Required:

- i. Test at 1% level of significance whether the average weekly food expenditure of the populations of women shoppers are equal. (6 marks)
 - ii. Explain 4 types of variations that may affect quality of forecasting model output. (8 marks)
- b) A business man wants to construct a hotel. He usually builds 25,50 or 100 bed hotels, depending on whether anticipated demand is low, medium or high. The businessman has been able to find out net profits which are expressed in the table below.

| Course of action | S_1 | S_2 | S_3 |
|-----------------------|--------------------|--------------------|---------------------|
| State of action | Build 25 bed hotel | Build 50 bed hotel | Build 100 bed hotel |
| O_1 = low demand | 20,000 | -10,000 | -30,000 |
| O_2 = medium demand | 25,000 | 25,000 | -5,000 |
| O_3 = high demand | 30,000 | 50,000 | 60,000 |

| State of nature = demand | O_1 | O_2 | O_3 | Total |
|-----------------------------|-------|-------|-------|-------|
| Probability | 0.2 | 0.3 | 0.5 | 1.00 |

Required: Compute

- i. EP (3 marks)
- ii. EPPI (3 marks)

Question three

a) From the following data obtained from a sample of 1,000 persons

| | | | | | | | | |
|------------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| Weakly earnings (Ksh 000) | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
| No. of persons | 50 | 100 | 150 | 200 | 200 | 100 | 100 | 100 |

Required

- i. Calculate the standard error of the mean. (8 marks)
 - ii. Is it likely that the sample has come from the population with an average weekly earnings of Ksh. 4,200. (4 marks)
- b) Discuss characteristics of a good estimator. (8 marks)

Question four

- a) Give two reasons why internal estimation is preferred to point estimation. (2 marks)
- b) The following constants are obtained from measurement in length (mm) (x1) volume in cc(x2) and weight in gms (x3) of 300 eggs.

$$\bar{x}_1 = 55.95 \quad s_1 = 2.26 \quad r_{12} = 0.578$$

$$\bar{x}_2 = 51.48 \quad s_2 = 4.39 \quad r_{13} = 0.581$$

$$\bar{x}_3 = 56.03 \quad s_3 = 4.41 \quad r_{23} = 0.974$$

Required:

- i. Obtain a linear regression equation of egg weight on egg length and egg volume (6 marks)
 - ii. Estimate the weight of an egg whose length is 58mm and volume of an egg whose length is 58mm and volume is 52.5cc. (2 marks)
- c) Briefly explain the procedure for testing of hypothesis. (4 marks)
- d) i) Explain circumstances under which t-test may be appropriate for hypothesis testing. (2 marks)
- ii) The annual profit is Ksh. (000) for 10 SMEs from a large population are as follows:
578, 572, 570, 568, 572, 578, 570, 572, 596, 544.

Required: Test the hypothesis that the mean profit of the SMEs in the industry is not 578. Test at 5% level of significance. (4 marks)

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