The Management University of Africa
Sponsored by the Kenya Institute of Management

UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF COMMERCE

BCM 411: MANAGERIAL STATISTICS

DATE: 1ST APRIL 2026

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

a) Explain four characteristics of a good estimator. Give practical examples in each case **(4 Marks)**

b) The number of workers employed, the mean wage per week and the standard deviation in each branch of a company are given below. Calculate the mean wages and standard deviation of all workers taken together for the factory.

Branch	**No. of workers**	**Weekly mean wage**	**Standard deviation**
A	50	1413	60
B	60	1420	70
C	90	1415	80

(5 Marks)

c) A random sample of 10 auto drivers insured with a company and having similar auto insurance policies was selected. The following data shows monthly auto insurance premium (in Kshs.000) paid by them. It is assumed that the distribution is normally distributed

42 36 45 20 29 37 26 33 23 12

Construct a 90% confidence interval for the true mean **(6 Marks)**

d) An *IQ* test was administered to 9 students and their mean *IQ* was found to be 95. Assuming the population variance is 144, is it true that the mean *IQ* in the population is less than 100? Use $\alpha = 0.15$, and assume that *IQ* is normally distributed. **(6 Marks)**

e) Consider the following distribution of CAT marks obtained by 10 students in BCOM class

BCM 321	26	21	28	26	31	30	24	18	21	32
BCM 300	19	22	25	28	27	21	23	21	28	22

Required:

Calculate the Rank Coefficient of Correlation and comment on the answer

(4 Marks)

QUESTION TWO

a) In a recent survey, 90% of the homes in a city were found to have colored TV's. In a sample of nine homes, what is the probability that:

   i. All nine have colored TV's? **(4 Marks)**

   ii. None of the family have colored TV's? **(4 Marks)**

   iii. Seven homes have colored TV's? **(3 Marks)**

b) Explain four functions of statistics **(4 Marks)**

QUESTION THREE

The following data refers to exam marks vs hours of study for a sample of 8 candidates that sat a statistics exam

Exam mark	64	61	84	70	88	92	72	71
Hours of study	20	16	34	23	27	32	18	22

a) Calculate the Pearson's product moment coefficient of correlation and interpret the results **(4 Marks)**

b) Calculate the coefficient of determination and give a comment about the correlation between exam marks and hours of study. **(2 Marks)**

c) Determine line of best fit and interpret the values **(4 Marks)**

d) Test the hypothesis that there is correlation between exam marks and hours of study at 95% level of confidence **(5 Marks)**

QUESTION FOUR

a) There are 2,500 newly recruited cadets into the police force. Their average height was found to be 168 cm with a standard deviation of 5 cm. If the height is assumed to follow a normal distribution, then determine the number of cadets whose heights was:

   i. Less than 158 cm **(4 Marks)**

   ii. Between 154 cm and 173 cm **(5 Marks)**

b) Using a well labeled diagram show the relationship between positive and negative skewness of a distribution relative to normal distribution **(6 Marks)**

QUESTION FIVE

a) The mean Calories (in pound) for 32 students following consumption of starch per week was 15 with a standard deviation of 0.18. Construct a 90% confidence interval for the true mean consumption μ. (Assume a normal distribution for the amount of sugar consumed) **(5 Marks)**

b) Differentiate between the following terms giving practical examples in each case:

i. Parameter and statistics **(2 Marks)**

ii. Estimator and estimate **(2 Marks)**

iii. One tailed test and two tailed test **(2 Marks)**

iv. Type 1 error and Type II error **(2 Marks)**

v. Descriptive and inferential statistics **(2 Marks)**

QUESTION SIX

A random sample of 50 auto drivers insured with a company and having similar auto insurance policies was selected. The following data shows monthly auto insurance premium (in Kshs.000) paid by them.

54	40	45	20	60	30	35	40	25	70	20	15
45	60	45	25	15	32	25	18	35	25	45	56
22	25	37	39	50	56	20	25	31	33	41	35
38	48	45	25	35	34	55	48	38	34	29	34
60	64										

a) Group the above data starting with the class 10 -20 exclusive **(4 Marks)**

b) Compute the mode and median of the distribution **(4 Marks)**

c) Calculate the standard deviation **(5 Marks)**

d) Find coefficient of variance **(2 Marks)**

FORMULAS

Mean = $\frac{\Sigma X}{n}$ Mean, = $\frac{\Sigma FX}{\Sigma F}$ Z-Formula = $\frac{Mean - Value}{standard\ \ deviation}$

Mode = L + $\frac{F1}{F1+F2} \times i$ or Mode $= L + \left(\frac{D_1}{D_1+D_2}\right).c$

Median = L + $\frac{i}{F}$ (m – c) or Median $= L + \left(\frac{\frac{N}{2} - F_{m-1}}{f_m}\right).c$

Variance = $\frac{\Sigma F(X - mean)^2}{\Sigma F}$ or Variance, $S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$

S = $\frac{\sqrt{\Sigma F(x - mean)^2}}{\Sigma F}$ or S $\sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

$CV = \frac{SD}{Mean} \times 100$ SKp= $3 \times \frac{(mean - median)}{Standard\ deviation}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\bar{X}_{12} = \frac{N_1\bar{X}_1 + N_2\bar{X}_2}{N_1 + N_2}$$

$$\delta_{12} = \sqrt{\frac{N_1\delta_1^{\ 2} + N_2\delta_2^{\ 2} + N_1d_1^{\ 2} + N_2d_2^{\ 2}}{N_1 + N_2}}$$

$$\mu = x_1 p(x_1) + x_2 p(x_2) + \ldots x_n p(x_n)$$
$$= \sum_{i=1}^{n} x_i p(x_i)$$

$$Var(X) = \sum_{i=1}^{n} (x_i - \mu)^2 . p(x_i)$$

$$\bar{x} - z_{\alpha/2} \frac{\delta}{\sqrt{n}} < \mu < \bar{x} + z_{\alpha/2} \frac{\delta}{\sqrt{n}}$$

$$\bar{x} - t_{n-1,\alpha/2}\frac{S}{\sqrt{n}} < \mu < \bar{x} + t_{n-1,\alpha/2}\frac{S}{\sqrt{n}}$$

$$Z = \frac{\bar{x} - \mu_0}{\delta/\sqrt{n}}$$

$$\chi^2 = \sum_{i=1}^{6}\frac{(O_i - E_i)^2}{E_i}$$

$$F = \frac{\text{MSB}}{\text{MSW}} \qquad \text{MSB} = \frac{\text{SSB}}{\text{k-1}} \qquad \text{MSW} = \frac{\text{SSW}}{n-k} \qquad \text{SSB} = \sum_{\text{j=1}}^{\text{k}}\frac{\text{T}_{\text{j}}^2}{\text{n}_{\text{j}}} - \frac{T^2}{N}$$

$$\text{SSW} = \sum_{j=1}^{k}\sum_{i=1}^{n_j} X_{ij}^2 - \sum_{j=1}^{k}\frac{T_j^2}{n_j}$$

$$r = \frac{n\sum XY - \sum X\sum Y}{\sqrt{\left[n\sum X^2 - \left(\sum X\right)^2\right]\left[n\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

$$r = 1 - \frac{6\sum d^2}{n\left(n^2 - 1\right)}$$

$$r\sqrt{\frac{n-2}{1-r^2}}.$$

$$\hat{b} = \frac{n\sum XY - \sum X\sum Y}{n\sum X^2 - \left(\sum X\right)^2}$$

$$\hat{a} = \frac{1}{n}\left(\sum Y - \hat{b}\sum X\right) = \bar{Y} - \hat{b}\bar{X}$$

$$T = \frac{\bar{x} - \mu_0}{S/\sqrt{n}}$$

$$\text{T} = \frac{\bar{x} - \bar{y}}{\delta\sqrt{\frac{1}{m} + \frac{1}{n}}}$$

$$p(n, x) = \binom{n}{x} p^x q^{n-x}$$