The Management University of Africa

Sponsored by the Kenya Institute of Management

POSTGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF DOCTOR OF PHILOSOPHY IN MANAGEMENT AND LEADERSHIP

DML 900: ADVANCED STATISTICS

DATE: 8TH DECEMBER 2023

DURATION: 3 HOURS

MAXIMUM MARKS: 50

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **FOUR (4)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **TWO** questions.
6. Question **ONE** carries **30 MARKS** and the rest carry **10 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

The frequency distribution of masses of 100 male students at some university is as given below

Mass(kg)	Class mark(X)	Frequency(f)
60-62	61	5
63-65	64	18
66-68	67	42
69-71	70	27
72-74	73	8

Compute

(i) Mean mass **(1 mark)**

(ii) Mean Absolute Deviation (MAD) **(2 mark)**

(iii) Percentage of students mass which fall in the range **mean ± 3MAD** **(3 mark)**

(iv) Standard deviation of the masses **(2 mark)**

(v) the coefficient of variation of the masses **(2 mark)**

b.) The CEO salary in a certain firm is such that it can be modelled as being dependent on the **rate of return on equity (roe)** such that

salary = 963.191 + 18.50 (roe)

and n =209 R^2=0.0132

(i) How much of the salary variation is explained by the firm's **roe**? **(2 mark)**

(ii) How much is the increase in salary given a unit increase in **roe**? **(2 mark)**

(iii) Suppose **roe** =10%, compute the corresponding salary for the CEO. **(2 mark)**

(iv) How much of the salary variation is not explained by **roe**? Suggest these other possible causes of the variation. **(4 mark)**

c.) A random sample of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that the proportions of men and women in favour of the proposal, are the same against that they are not, at 5% level. **(10 marks)**

QUESTION TWO

a) A machine produced 16 defective bolts in a batch of 500. After overhauling, it produced 3 defectives in a batch of 100. Has the machine improved? **(4 marks)**

b) A sample of 900 members has a mean of 3.5 cm and a standard deviation of 2.61 cm

i. Is the sample from a large population with mean 3.25 cm and standard deviation of 2.61 cm? **(4 marks)**

ii. Find 95% Confidence Interval of the true mean **(2 mark)**

QUESTION THREE

Consider the following data where X and Y denote the mass of the father and the oldest son respectively.

	5	3	7	4	8	2	0	6	8	7	9	1
	8	6	8	5	9	6	8	5	1	7	8	0

a.) Compute

i.) coefficient of linear correlation **(4 marks)**

ii.) coefficient of rank correlation **(4 marks)**

b.) Comment on results in part (a) **(2 mark)**

QUESTION FOUR

Consider the following random variables X and Y presented in the following Table.

X	1	3	4	6	8	9	11	14
Y	1	2	4	4	5	7	8	9

(a) Compute

I) The standard deviation of X **(2 mark)**

II) The standard deviation of Y **(2 mark)**

III) Variance of X **(2 mark)**

IV) Covariance of X and Y **(2 mark)**

(b) Using the results in part (a) or otherwise, compute the coefficient of linear correlation between X and Y. **(2 mark)**