(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS
MAIN EXAM

2023/2024 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER **EXAMINATION**
FOR THE DEGREE OF BACHELOR OF SCIENCE IN EPIDEMIOLOGY AND BIOSTATISTICS (BSc EPIMED)

COURSE CODE: HEM 314
COURSE TITLE: LINEAR STATISTICAL MODELS

DATE: 8/12/2023   TIME: 2.00-4.00 PM

INSTRUCTIONS TO CANDIDATES:
Answer all Questions from section A and any other two questions from section B
TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating
Paper Consists of 3 Printed Pages. Please Turn Over

Instruction: attempt all question in this section

1. Using the data below;

X		70	66	71	68	67	69	66	65
Y		42	40	44	42	47	43	40	42

Determine the correlation between height (x) and length (y), Using the Karl Pearson,s Method. Interpret your results.
(8 marks)

2. The following data represents income and expenditure (in '000Ksh) of some households:

Income	12	15	8	5
Expenditure	4	3	2	1

Study the following SPSS output of the given data and use it to answer questions that follow

Table 1 output

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.822[a]	.676	.514	.900

a. Predictors: (Constant), Income

Table 2 output

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.086	1.265		.068	.952
	Income	.241	.118	.822	2.042	.178

a. Dependent Variable: Expenditure

    a. Write down the fitted model. (1 marks)
    b. Comment on the significance of each of the model parameters. (6 marks)
    c. Identify R^2 and comment on it. (2 marks)

3. State the 4 assumptions in the Analysis of variance. (4 marks)
4. In a study of the relationship between consumption and price, the data below was obtained;

Consumption	690	890	580	620	543	950	726	815	750
Price	44	33	58	52	62	24	39	33	35

a. Construct the ANOVA table for testing the regression effect. (14 marks)
b. Test for B_1. (5 marks)

Question 1   **(15 marks)**

The table below shows the yields per acre of 4 different plant crops grown on lots treated with three different types of fertilizers. Test at 0.01 level of significance whether;

a.   There is no significant difference in yield per acre due to fertilizer.

b.   There is no significant difference in yield per acre due to crops.

	Crop 1	Crop 2	Crop 3	Crop 4
Fertilizer A	4.5	6.4	7.2	6.7
Fertilizer B	8.8	7.8	9.6	7.0
Fertilizer C	5.9	6.8	5.7	5.2

(15 marks)

Question 2   **(15 marks)**

Given the following;

$X_1 = 5, 9, 6, 8$

$X_2 = 11, 13, 10, 12$

$X_3 = 10, 6, 9, 9$

Test $H_0 : \mu_1 = \mu_2 = \mu_3$ against $H_1 : \mu_1 \neq \mu_2 \neq \mu_3$ at $\alpha = 0.01$ level of significance. (15 marks)

Question 3   **(15 marks)**

The following table shows scores made by salesmen on intelligence test score, education level and weekly sale.

Salesman education level	3	8	4	5	9
Intelligence test score	40	70	50	60	80
Sales	2	6	4	5	4

Fit a multiple regression model to the data by method of least squares. Hence, estimate the probable weekly sales volume of a salesman whose education of level 14 makes a score of 100.

(15 marks)