The Management University of Africa

Sponsored by the Kenya Institute of Management

POST GRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF MASTER OF BUSINESS ADMINISTRATION/ MASTER OF MANAGEMENT AND LEADERSHIP/ MASTER OF ARTS IN DEVELOPMENT STUDIES

MBA 505/ MML 5102/ MDE 517: QUANTITATIVE TECHNIQUES FOR MANAGERS/ STATISTICAL DECISIONAL ANALYSIS/ SOCIAL STATISTICS

DATE: **22ND JULY, 2022**

DURATION: 3 HOURS

MAXIMUM MARKS: 60

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 **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided**

QUESTION ONE

a) Consider the following distribution in table 1 below.

Table 1: Distribution table

CLASS	FREQUENCY
10-20	10
20-30	f_1
30-40	15
40-50	20
50-60	f_2
60-70	11

Given the median of the distribution as 41 and the total number of observations as 82, find

i. Missing frequencies f_1, and f_2 **(3 Marks)**

ii. Find the coefficient of variance **(4 Marks)**

b) An electric firm manufactures three types of computers, a standard model, portable model and a lap top. The production of a standard computer requires a capital of Shs. 400 and 40 hours of labour. The production of portable computers requires a capital expenditure of Shs. 250 and 30 hours of labour. The production of lap top requires a capital expenditure of Shs. 300 and 25 hours of labour. The firm has a Shs. 20,000 capital and 2160 hours available for production of standard computers, portable computers and laptop. The firm makes a profit of Shs. 320 on each standard computer, Shs. 220 on each portable computer and Shs. 280 on each lap top.

Required:

i. Formulate the mathematical model for this problem **(2.5 Marks)**

ii. Obtain the dual programme **(2.5 Marks)**

c) Using a diagram illustrate relative positioning of the three measures of central tendency on the two types of skewness **(3 Marks)**

d) Giving practical examples in each case, explain four characteristics of a good estimator **(4 Marks)**

e) A researcher wished to investigate the effect of leadership styles on the performance of micro finance institutions (MFIs) in Kenya. The data was collected on the gender of the respondents (with major classification as male and female) and various leadership styles adopted in MFIs. The researcher wanted to determine if leadership styles adopted (with various categories of leadership styles) is dependent on the gender of the respondents (categorized as Male and female). Giving reasons, explain the appropriate statistical test to adopt **(2 Marks)**

f) Using practical examples differentiate between:

i. Estimator and estimate **(1.5 Marks)**

ii. One tailed test and two tailed tests **(1.5 Marks)**

iii. Level of significance and level of confidence **(2 Marks)**

g) An MML student carried out a study on strategic planning (X_1), leadership practices (X_2) and performance (Y) of non-Governmental organizations in Nairobi County, Kenya. After data analysis using multiple regression model and by use of SPSS, he had the output presented in Table 2;

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.815	0.664	0.314	0.4211

Final model : $Y= 1.308+ 0.558X_1+ 0.785X_2$

Required:

a) Interpret the value of R-square obtained **(2 Marks)**

b) Interpret the final model **(2 Marks)**

QUESTION TWO

a) The life times of electric components manufactured by Raman Industries Ltd are normally distributed with mean of 2500 hours and standard deviation of 600 hours. If the daily production is 500 components, how many components are expected to have a life time of:

i) Less than 2600 hours **(2 Marks)**

ii) Between 2350 hours and 2580 hours **(3 Marks)**

iii) More than 2380 hours **(2 Marks)**

b) Using an example explain any two methods of constructing a simple index number **(4 Marks)**

c) Giving examples in each case, explain the four scales of measurement that a researcher may adopt when conducting a study **(4 Marks)**

QUESTION THREE

a) The height and weight of baseball players are given table 3 in below ("MLB heights weights").

Table 3: Height and weight of baseball players

Height (Inches)	76	72	74	75	71	77	78	76	70	71	73
Weight (Pounds)	212	180	210	215	200	235	211	216	223	190	205

i) Determine the regression equation of Y on X. **(3 Marks)**

ii) Compute the coefficient of correlation and coefficient of determination and interpret their values. **(4 Marks)**

iii) Test the hypothesis that the population correlation coefficient is zero at the 5% level. **(3 Marks)**

b) Mr. Otieno, a manager for a sales company wished to employ one of the three salesmen who had been on internship for the past six months. In consultation with other managers, they agreed their decisions on who to employ will be based on average sales from the three salesmen. However, there was an argument between the managers that the differences between the sales recorded were by chance and not significant. Mr. Otieno has consulted you to offer your expert advise from statistics. Advice Mr. Otieno on the best statistical tool to use to determine if the mean sales are significance giving 3 reasons for your answer. **(5 Marks)**

QUESTION FOUR

a) Suppose a study carried out among 627 individuals focused on two variables: Category and Type. The results are as shown in table 4 below:

Table 4: Category and Type of individuals

TYPE	CATEGORY			Total Row
	A	B	C	
X	52	69	72	193
Y	78	54	65	197
Z	90	76	71	237
Total Column	220	199	208	

Test the hypothesis that the Categories are independent of the Type at 5% significance level **(7 Marks)**

b) State any two assumptions in each of the following statistical tools:

i. Analysis of Variance **(2 Marks)**

ii. Chi-Square **(2 Marks)**

c) Use an example to illustrate the following terms as used in decision making

i. Saddle point **(2 Marks)**

ii. Dominance **(2 Marks)**

FORMULAS

$$\text{Mean} = \frac{\sum X}{n} \qquad \text{Mean}, = \frac{\Sigma FX}{\Sigma F} \qquad \text{Z-Formula} = \frac{\text{Mean\_Value}}{\text{standard deviation}}$$

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

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

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

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

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad \bar{X}_{12} = \frac{N_1\bar{X}_1 + N_2\bar{X}_2}{N_1 + N_2}$$

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

$$\delta_{12} = \sqrt{\frac{N_1\delta_1^2 + N_2\delta_2^2 + N_1 d_1^2 + N_2 d_2^2}{N_1 + N_2}}$$

$$Var(X) = \sum_{i=1}^{n} (x_i - \mu)^2 . p(x_i) \qquad \bar{x} - z_{\alpha/2}\frac{\delta}{\sqrt{n}} < \mu < \bar{x} + z_{\alpha/2}\frac{\delta}{\sqrt{n}}$$

$$\bar{x} - t_{n-1,\alpha/2}\frac{S}{\sqrt{n}} < \mu < \bar{x} + t_{n-1,\alpha/2}\frac{S}{\sqrt{n}} \qquad \frac{\bar{X} - \bar{Y}}{\sqrt{\frac{\delta_1^2}{m} + \frac{\delta_2^2}{n}}}$$

$$Z = \frac{\bar{x} - \mu_0}{\delta/\sqrt{n}} \qquad \chi^2 = \sum_{i=1}^{6} \frac{(O_i - E_i)^2}{E_i} \qquad F = \frac{MSB}{MSW}$$

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

$$\text{SSW} = \sum_{j=1}^{k}\sum_{i=1}^{n_j} X_{ij}^2 - \sum_{j=1}^{k}\frac{T_j^2}{n_j} \qquad r = \frac{n\sum XY - \sum X\sum Y}{\sqrt{\left[n\sum X^2 - \left(\sum X\right)^2\right]\left[n\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

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

$$T = \frac{\overline{x} - \mu_0}{S/\sqrt{n}} \qquad \hat{b} = \frac{n\sum XY - \sum X\sum Y}{n\sum X^2 - \left(\sum X\right)^2}$$

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