



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF BUSINESS ADMINISTRATION

FIRST YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

MASTER OF BUSINESS ADMINISTRATION

BMS 840: QUANTITATIVE TECHNIQUES

DATE: 24/3/2021

TIME: 9.00-12.00 PM

INSTRUCTIONS:

Answer question ONE and any other THREE questions

QUESTION ONE (30 MARKS)

- a) Explain briefly four ways statistics can be applied in managing a business enterprise (4 marks)
- b) Ten candidates did oral and aptitude tests for a certain managerial position and scored the following marks in percentage.

Contestants	A	B	C	D	E	F	G	H	I	J
Oral test	70	57	36	80	48	50	60	68	75	45
Aptitude test	62	47	43	70	50	55	68	69	72	42

- Determine the Spearman's rank correlation coefficient and interpret it. (5 marks)
- c) some undergraduate students sat for the end of the semester exam in a certain statistics course and scored the following marks.

20	40	76	10	70	35	45	65	78	88
69	90	40	40	10	30	30	44	84	10
56	20	10	90	90	82	50	22	80	40
79	50	50	90	70	90	29	30	50	26

- i. Find the mean and standard deviation of the marks (2 marks)

- ii. Construct a 97.5 % confidence interval estimate for the mean of the sampled population. (3 marks)
- d) A mobile shop sells two brands of Samsung and Nokia phones. The revenue function of the shop is expressed as follows:

$$R = 48S + 72N - 12S^2 - 6N^2 + 12SN$$
Where, R = revenue, S = the units of Samsung phones and N = the units of Nokia phones sold daily
- i. Find the optimal units of Samsung and Nokia phones that should be sold to maximize the daily revenue (6 marks)
- ii. Find the daily optimum level of revenue (2 marks)
- e) A gynecologist observed that the weights of many of the babies delivered in a certain hospital followed a normal distribution with a mean weight of 3.6 Kgs and a standard deviation of 0.6 kgs. He noted that a sample of 36 babies who got delivered in one month had a mean weight of 3.2 Kgs. Perform the necessary hypothesis test at 5% level of significance to find out if this sample of babies actually had a lower mean weight. (8 marks)

QUESTION TWO (10 MARKS)

A financial expert seeks to examine whether there is a relationship between the level of education and the income groups of self-employed people in the informal sector. A sample of 2000 people is selected and their data recorded as follows.

Income Group

Education/Income Level	Low Income	Middle Income	High Income
Graduate	400	400	400
Non-graduate	200	400	200

Test whether the level of education is independent of income group at 5%. (10 marks)

QUESTION THREE (10 MARKS)

Naivas supermarket wanted to determine whether the mean sales in different regions were the same. Five branches in each region were sampled and their monthly sales were recorded as follows in millions of Kenya Shillings

Nakuru	Eldoret	Nairobi	Mombasa
61	46	75	59
68	53	64	73
59	59	68	70
56	56	78	63
51	61	75	75

Perform ANOVA test at 5% level to determine whether the mean sales for the four regions were equal. (10 marks)

QUESTION FOUR (10 MARKS)

Three types of vegetables were tested to determine if the content of a certain type of vitamin was the same for each. Random sample data (milligrams of vitamin per 100 grams of vegetable) are given in the table below. Perform the Kruskal Wallis test at the 5% level to determine if mean vitamin content for the vegetables was the same

Spinach	Kales	Cabbages
42	34	62
54	50	56
58	40	44
46	30	60
50	46	48
64	66	70

Perform the Kruskal Wallis test at the 5% level to determine if the mean contents of the 3 vegetables are equal (10 marks)

QUESTION FIVE (10 MARKS)

An electronic manufacturing company produces two types of gadgets labelled X and Y whose number should not exceed 11 every day. The company’s daily budget for the production for the two gadgets is not more than \$ 6000. The daily costs of production per unit of X and Y are \$ 600 and \$ 500 respectively. The prices per unit of X and Y are \$ 1000 and \$ 850 respectively.

- a) Formulate a linear program using the above information (3 marks)
- b) Determine the optimum number of the two types of gadgets, X and Y, that should be produced daily to maximize the revenue (7 marks)