



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF SCIENCE AND  
TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS/BUNGOMA/WEBUYE**

**UNIVERSITY SPECIAL AND SUPPLEMENTARY EXAMINATIONS**

**2021/2022 ACADEMIC YEAR**

**SECOND YEAR FIRST SEMESTER EXAMINATION**

**FOR THE DEGREE  
OF  
BACHELOR OF COMMERCE**

**COURSE CODE:   BCB 318**

**COURSE TITLE:   MANAGERIAL STATISTICS**

**DATE: WEDNESDAY, 3<sup>RD</sup> AUGUST 2022    TIME: 8:00 - 10:00AM**

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**INSTRUCTIONS TO CANDIDATES**

Answer question **ONE** and any other **THREE** questions

**TIME: 3 HOURS**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

**QUESTION ONE (COMPULSORY) (30 MARKS)**

(a) Explain the following terms used in statistical inference:

- (i) Null hypothesis. (2 marks)
- (ii) Parametric test (2 marks)
- (iii) Type I and type II error (2 marks)

(b) In an analysis of the results of B.COM students. The examining body classified the results as either; credit, pass or discontinued. Further, the board analyzed the student's method of study which was either; full-time, part-time or private. An employee of the board cross-classified the examination results and the method of study of 300 students. He then computed a test statistic of 42.28.

**Required:**

- (i) State the null and alternative hypotheses that should be tested. (4 marks)
  - (ii) What conclusion can be drawn from the results of the data? (Use  $\alpha = 0.05$ ). (4mark)
- (c) A survey of undergraduate students at MMUST showed the following results regarding gender and the fields of specialization in their studies.

Field of specialization				
Gender	Business	Science	Arts	Total
Male	100	250	100	<b>450</b>
Female	<u>200</u>	<u>50</u>	<u>100</u>	<b>350</b>
<b>Total</b>	<b><u>300</u></b>	<b><u>300</u></b>	<b><u>200</u></b>	<b><u>800</u></b>

**Required:**

- (i) Determine if the field of specialization in the studies is dependent on gender (use a significance level of 5%). (10 marks)
  - (ii) An earlier survey showed that the proportion of female students taking science was only 10% of the total student population taking science. Does the data above show any significant improvement in the proportion of female students taking science (use a significance level of 5%)? (6 marks)
- d) The following data relate to advertising expenditures in Ksh ten thousands and their corresponding sales (in Ksh millions)

Advertising Expenditure	10	12	15	23	20
Sales	14	17	23	25	21

Estimate the sales corresponding to advertising expenditure of Ksh 300,000. (10 marks)

**QUESTION TWO (20 MARKS)**

a) Explain the meaning of the following sampling fundamentals:

- i. Sampling error (2 marks)
  - ii. Central limit theorem (2 marks)
- b) A production department uses a sampling procedure to test the quality of newly produced items. The department employs the following decision rule at an inspection station: If a sample of 14 items has a variance of more than 0.005, the production line must be shut down for repairs. Suppose the following data have just been collected.

3.43    3.45    3.43    3.48    3.52    3.50    3.39  
 3.48    3.41    3.38    3.49    3.45    3.51    3.50

**Required:** Should the production line be shut down? Explain. (8 marks)

- c) Capital Computer Company has developed a new computer accounting software package to help accountancy analysis reduce the time required to design, develop and implement an accounting system. To evaluate the benefits of the new software package, a random sample of 24 accountancy analysis is selected. Each analyst is given specifications for a hypothetical accounting system. Then 12 of the analysis are instructed to produce the accounting system by using the current technology. The other 12 analysts are trained in the use of the new software package and then instructed to use it to produce the accounting system. The 24 analysts complete the study and the results are shown below:

Completion Time Data and Summary Statistics for the Software Testing Study

	Current technology	New technology
	300	276
	280	222
	344	310
	385	338
	372	200
	360	302
	288	317
	321	260
	376	320
	290	312
	301	334
	283	265
Sample size	$n_1 = 12$	$n_2 = 12$
Sample mean	$\bar{X}_1 = 325$	$\bar{X}_2 = 288$
Sample standard deviation	$S_1 = 40$	$S_2 = 44$

**Required:** Determine whether the new software package should be adopted at 95% confidence level. (8 marks)

Note: 
$$S^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

and

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\left\{ S^2 \left[ \frac{1}{n_1} + \frac{1}{n_2} \right] \right\}^{1/2}}$$

**QUESTION THREE (OPTIONAL) (20 MARKS)**

- (a) Due to high operational cost, Kenya Commercial Bank (KCB) wishes to close those savings accounts that do not maintain a certain minimum monthly balance. Currently the mean monthly

balance of the savings accounts is Sh. 25,000 with a standard deviation of Sh. 5,000. The bank wishes to close 10% of the accounts with the lowest monthly balance. Further, the balances are assumed to be normally distributed.

**Required:** The monthly balance that KCB should require its savings accounts customers to maintain in order for the accounts not to be closed. (6 marks)

- (b) Electrical Products Ltd. manufactures, among other products, lighting bulbs. Recently, the company launched a new energy saving lighting bulb. The brand manager claims that this new model has a mean life of at least 1800 hours. A quality controller decides to verify the claim and selects a random sample of 50 bulbs. He records the lives of the bulbs as summarized below:

Length of life (hours)	Number of bulbs
1000 – 1200	1
1200 – 1400	4
1400 – 1600	8
1600 – 1800	10
1800 – 2000	11
2000 – 2200	7
2200 – 2400	5
2400 – 2600	3
2600 – 2800	1

**Required:**

Determine if the data support the claim of the brand manager (use  $\alpha = 0.01$ ). (14 marks)

**QUESTION FOUR (OPTIONAL) (20 MARKS)**

- a) Set up an analysis of variance table for the following per acre production data for three varieties of wheat each grown on 4 plots and state if the variety differences are significant. (15 marks)

Plot of Land	Variety of wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

- b) Discuss five importance of statistical quality control system in an organization. (5 marks)

**QUESTION FIVE (OPTIONAL) (20 MARKS)**

- a) In a sample of 800 candidates 560 were male. Estimate the population proportion at 95% confidence level. (5 marks)
- b) Two different types of drugs A and B were tried on certain patients for increasing weights, 5 persons were given drug A and 7 persons were given drug B. The increase in weight in kilograms is given below

Drug A	8	12	16	9	3		
Drug B	10	8	12	15	6	8	11

Do the two drugs differ significantly with regard to their effect in increasing weight? (15 marks)

(Given that  $v = 10$ ;  $t_{0.05} = 2.23$ )

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