



MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

THIRD YEAR SECOND SEMESTER EXAMINATIONS FOR

BACHELOR OF SCIENCE (FASHION DESIGN AND MARKETING)

BACHELOR OF SCIENCE (COMMUNITY RESOURCE MANAGEMENT)

HCU 301-INTRODUCTORY STATISTICS

DATE:

TIME:

INSTRUCTION: Attempt question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a). Explain the meaning of the following terms as applied in Statistics

(i) Population

(ii) Sample

(iii) Data

(6 marks)

b) Differentiate between EACH of the following terms:

(i) Descriptive and inferential statistics

(2 marks)

(ii) Discrete and continuous variable

(2 marks)

c) The table below shows marks scored by students in a statistics examination

Class	40-44	45-49	50-54	55-59	60-64
Frequency	6	10	25	11	2

Calculate the mean and standard deviation

(6 marks)

(d) In a random sample of 64 patients in community based dispensary, the meaning waiting time for being served is 3 minutes is with a standard deviation of 1.5 minutes. Construct a 99% confidence interval for the average waiting time in the dispensary. (5 marks)

- (e) Given that $H_0: \mu = 100$, $H_a: \mu > 100$, $n = 64$, $\bar{x} = 110$, $s = 40$, test the null and alternate Hypothesis at a significance of $\alpha = 0.05$. (4 marks)
- (f) Determine the values of a, b, c, d, e from the following ANOVA Table

	Sum of Squares	Degrees of Freedom	Mean Squares	F-Ration
Factor	a	2	c	e
Error	1750	b	d	
Total	2572.22	8		

(5 marks)

QUESTION TWO (20 MARKS)

- (a) Explain the meaning of the following sampling techniques:-

- (i) Random sampling
- (ii) Stratified sampling
- (iii) Quota sampling
- (iv) Cluster sampling

(8 marks)

- (b) The data below shows gross weekly earnings of employees by age of a community based organization in the year 2008.

Age (years)	18	20	22	27	35	45	55
Weekly earnings ('000)	15.50	23.20	34.0	44.90	53.10	55.0	57.20

- (i) Calculate the least squares regression line of gross weekly earnings on age. (10 marks)
- (ii) Use the equation in (i) to estimate the weekly earnings of an employee aged 50 years (2 marks)

QUESTION THREE (20 MARKS)

The following are the speeds, in miles per, of a group of cars on a high-way as measured with radar gun

58,62,59,53,61,55,57,54,59,53,66,60,58,60,61,58,56,60,58,62,57,55,53,55,61,57,52,58,49,54,52,55,57,60,64,67.

- (i) Construct a frequency distribution table with class interval by 45-49,...etc (6 marks)
- (ii) use the table in (a) above to calculate
 - (ii) the mode (3 marks)
 - (iii) the median (3 marks)
 - (iii) the quartile deviation (8 marks)

QUESTION FOUR (20 MARKS)

- a) A small marketing firm is interested in analyzing the effects of advertisements on its sales. Over a 5-month period the results are as follows

Money spend on advertising (sh. 000')	Total sales (sh. '000')
5	6
8	15
10	20
15	30
22	39

Calculate the correlation coefficient between sales and advertising. (8 marks)

- (b) The following table shows the number of children in households in Mombasa County in 2010

Number of children in the household	Number of households
None	25
1	40
2	42
3	28
4	18
5	11
6	9
7 or more	6
	179

- (i) Calculate the mean and standard deviation of children per households. (7 marks)

- (ii) Assuming the data is based on a simple random sample from a large population; calculate a 95% confidence interval for the mean number of children in Mombasa county (5 marks)

QUESTION FIVE (20 MARKS)

a) Explain the meaning of each of the following terms as used in probability theory.

- (i) Random experiment
- (ii) An event
- (iii) Mutually exclusive events
- (iv) Independent events. (8 marks)

b) A survey is conducted among workers in a certain city to determine if there is any difference between the proportions of women and men who drive to work, take the bus to work, or take the subway to work. The results are as shown below:

	Drive	Bus	Subway
Women	25	100	125
Men	75	120	205

- (i) Construct the corresponding table of expected frequencies. (6 marks)
- (ii) Determine the value of the chi-square statistic. (6 marks)