MACHAKOS UNIVERSITY

University Examinations 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (FASHION DESIGN AND MARKETING)

BACHELOR OF SCIENCE (COMMUNITY RESOURCE MANAGEMENT)

HCU 301: INTRODUCTORY STATISTICS

DATE: 6/12/2021 **TIME: 8.30-10.30 AM**

INSTRUCTION:

Answer Question One and Any Other Two Questions

QUESTION ONE (30 MARKS)

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

i. Population (2 marks)

ii. Null hypothesis (2 marks)

b) Differentiate between EACH of the following terms:

i. Nominal and interval measurement (2 marks)

ii. Primary and secondary data. (2 marks)

c) The data given below represents the frequency distribution of marks scored in mathematics by 250 students.

Grade scored	1	2	3	4	5	6	7	8
No. of students	8	20	36	64	48	40	24	10

Determine each of the following measures about the distribution

i. Median

ii. Mean

iii. Standard deviation (7 marks)

d) In the course of an audit it was found that from a simple random sample of 200 bad debts that the mean debt was £48.50 with a standard deviation of £6.50. Calculate a 99% interval for the mean debt (6 marks)

e) Given that $H_0: \mu = 100, H_a: \mu < 100, n = 36, \bar{x}$=94, s=30, test the null and alternate hypothesis at a significance of α=0.05. (4 marks)

f) Determine the values of a, b, c, d, e from the following ANOVA Table (5 marks)

	Sum of Squares	Degrees of Freedom	Mean Squares	F-Ration
Factor	354.67	b	c	e
Error	a	9	d	
Total	676.67	11		

QUESTION TWO (20 MARKS)

a) Past records suggest that the heights of graduates of a certain college (at the time of their graduation) fit a normal distribution with mean 165 cm and standard deviation 6 cm. Use this information to determine:-

i. The percentage of graduates whose heights is less than 170 cm. (4 marks)

ii. The percentage of graduates whose heights is between 170 cm and 175 cm.(6 marks)

b) A college collects the following set of data on the number of credits that a randomly selected group of students carry and the number of hours they work during the week

Hours worked per week	20	25	30	50	20	23
Number of credits	12	13	12	15	16	16

Determine the linear regression equation for number of credits as a function of number of hours worked during the week. (10 marks)

QUESTION THREE (20 MARKS)

The data below shows the number of hours worked in one week by employees in certain company

46.3 39.2 44.2 41.3 45.1 42.3 43.5 40.0

45.6 40.6 42.0 42.6 45.6 39.5 43.1 39.7

46.138.9 42.4 42.1 45.0 44.4 42.4 40.8

a) Tabulate a frequency distribution table with class intervals by 38.9 – 40.4, … etc (6 marks)

b) Use the table in 2(a) above to calculate the:

i. Mode (6 marks)

ii. Quartile deviation (8 marks)

QUESTION FOUR (20 MARKS)

a) A small company is interested in analyzing the effects of advertising on its sales over a five-week period as shown below:

Money spend on advertising	2	5	7	10	11
Total sales	10	20	35	50	65

Use the data to determine correlation coefficient between the total sales and the money spend on adverting. (8 marks)

b) The following table shows the number of household members in certain town in 2010.

No of House hold Members	Percentage
1	18
2	32
3	20
4	19
5	7
6 or more	4

i. Calculate the mean and standard deviation of the number of households. (6 marks)

ii. Assuming the data is based on a single random sample of 445; calculate a 95% confidence interval for the mean household size. (6 marks)

QUESTION FIVE (20 MARKS)

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

i. Simple Random sampling

ii. Stratified sampling

iii. Judgmental sampling

iv. Cluster sampling (8 marks)

b) A consumer research organization conducts a survey of drivers to determine if there is any difference in their choice of brand of Japanese-made cars based on their gender as shown below

	Toyota	**Subaru**	**Nissan**
Women	70	80	150
Men	40	60	100

i. Construct the corresponding table of expected frequencies. (6 marks)

ii. Determine the value of the chi-square statistic. (6 marks)