



# MACHAKOS UNIVERSITY

University Examinations 2020/2021 Academic Year

## SCHOOL OF HUMANITIES AND SOCIAL SCIENCES DEPARTMENT OF FASHION DESIGN AND MARKETING

University Supplementary Examinations  
**HCU 301-INTRODUCTORY STATISTICS**

**Date:**

**Time:**

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**Instruction: Attempt 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
- (ii) Sample (2marks)

(b). Differentiate between EACH of the following terms:

- i. Point and interval estimation (2marks)
- ii. Acceptance and critical regions. (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 (6marks)

(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 95% interval for the mean debt (6marks)

(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  $\alpha = 0.05$ . (3marks)

(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	205	b	c	e
Error	a	16	d	
Total	287	19		

(5 marks)

(f) A number is chosen at random from the numbers 1, 2, ..., 30. Determine the probability that it is:

- i. divisible by 3
- ii. divisible by 4
- iii. divisible by both 3 and 4
- iv. divisible by 4, given that it is divisible by 3. (4marks)

## QUESTION TWO

(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 advertising. (8marks)

b) A supermarket owner is studying how the average waiting time in minutes for customer checkout depends on the number of checkout clerks working as shown below

Checkout clerk	3	4	5	5	6	7
Waiting time	9	6	6	4	2	1

- i) Determine the linear regression equation for waiting time as a function of the number of clerks on duty. (10marks)
- ii) Use the equation on (i) above to predict the most likely waiting time for 9 checkout clerks (2marks)

### QUESTION THREE

(a) Explain the meaning of the following terms as used in probability theory:

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

b). The following are the speed, 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 (6marks)
- (ii) use the table in (i) above to calculate the mode and median (6marks)

### QUESTION FOUR

a) The following frequency distribution, the lower quartile is 44.5. Determine the values of  $a$  and  $b$

<u>CLASS</u>	<u>FREQUENCY</u>
30 – 34	7
35 – 39	12
40 – 44	$a$
45 – 49	$b$
50 – 54	38
55 – 59	15
60 – 64	8
	$\Sigma f = 200$

(8 marks)

(a) The mean weight of a consignment of 500 sacks of sugar is 151 kg and the standard deviation is 15kg. Assuming that the weight are normally distributed, determine how many sacks weigh:

- (i) Between 120kg and 155kg (4marks)
- (ii) More than 185kg (4marks)
- (iii) Less than 128kg (4marks)

**QUESTION FIVE**

(a).A company has a computer system that can process 1200 bills per hour. A new system is installed that can process an average of 1260 bills per hour with a standard deviation of 215 bills in a sample of 40 hour. Test if the new system is significantly better than the old one at the 5% level of significance. (6marks)

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

	<b>Drive</b>	<b>Bus</b>	<b>Train</b>
<b>Women</b>	25	100	125
<b>Men</b>	75	120	205

- (i) State the null and alternative hypothesis. (2 marks)
- (ii) Construct the corresponding cross-tabular contingency table for the expected frequencies. (6 marks)
- (iii) Test whether there is any difference in the proportions using the different modes of transport based on gender at  $\alpha =0.01$  level of significance. (6 marks)

