



# MACHAKOS UNIVERSITY

University Examinations 2019/2020 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FOURTH YEAR SPECIAL /SUPPLEMENTARY EXAMINATION FOR  
BACHELOR OF SCIENCE (COMMUNITY RESOURCE MANAGEMENT)

ASC 102: SOCIAL STATISTICS I

DATE: 20/01/2021

TIME: 8.30-10.30 AM

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## INSTRUCTIONS TO CANDIDATES

Answer question **ONE (compulsory)** and any other **TWO** questions

### QUESTION ONE (30 MARKS)

- a) Explain the meaning of the following terms as applied in Statistics
- Population
  - Sample
  - Variable
  - Data
- (8 marks)
- b) Differentiate between each of the following terms:
- Descriptive and inferential statistics
  - Primary and Secondary data
  - Point and interval estimation
- (6 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) A college collects the following set of data on the number of credits  $C$  that a randomly selected group of students carry and the number of hours  $H$  that they work during the week

|   |    |    |    |    |    |    |
|---|----|----|----|----|----|----|
| H | 20 | 25 | 30 | 50 | 20 | 23 |
| C | 12 | 13 | 12 | 15 | 16 | 16 |

Determine the rank correlation coefficient based on these data (5 marks)

- e) In a random sample of 64 customers in a computer service company, the mean waiting time for being served is 3 minutes with a standard deviation of 1.5 minutes. Construct a 95% confidence interval for the average waiting time in the company. (5 marks)

## QUESTION TWO (20 MARKS)

- a) Explain the meaning of the following sampling techniques:-
- Simple Random sampling
  - Stratified sampling
  - Judgmental sampling
  - Cluster sampling
  - Multistage sampling (10 marks)
- b) A small company is interested in analyzing the effects of advertising on its total sales, over a 5-month period. The results are as follows

|             |    |    |    |    |    |
|-------------|----|----|----|----|----|
| Advertising | 2  | 5  | 7  | 10 | 11 |
| Sales       | 10 | 20 | 35 | 50 | 65 |

Calculate the correlation coefficient between total sales and advertising. (10 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.

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

**QUESTION FOUR (20 MARKS)**

- a) State and explain the four measurement scales for statistical data as outlined by Stevens (1946) (8 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 |

- i. Determine the linear least squares regression equation for number of credits as a function of the number of hours worked during the week (10 marks)
- ii. Use the equation in (a) above to predict the number of credits for a student who worked for 40 hours per week (2 marks)

**QUESTION FIVE (20 MARKS)**

- a) The median of the following frequency distribution is 59.5 and the ninetieth percentile is 79.5. Determine the values of  $a$ ,  $b$  and  $c$  (10 marks)

| Class | Frequency      |
|-------|----------------|
| 30-39 | 14             |
| 40-49 | $a$            |
| 50-59 | 40             |
| 60-69 | $b$            |
| 70-79 | 19             |
| 80-89 | $c$            |
|       | $\sum f = 150$ |

- b) The following table shows the number of rooms in dwellings in Mombasa county in 2006

| Number of rooms | Percentage of dwellings |
|-----------------|-------------------------|
| 1               | 1                       |
| 2               | 2                       |
| 3               | 8                       |
| 4               | 21                      |
| 5               | 33                      |
| 6               | 26                      |
| 7               | 5                       |
| 8 or more       | <u>4</u>                |
|                 | <u>100</u>              |

- i. Calculate the mean and standard deviation of the above distribution. (6 marks)
- ii. Assuming the data is based on a single random sample of 8120; calculate a 95% confidence interval for the mean number of dwellings in Mombasa county (4 marks)