



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF HEALTH SCIENCES**

**UNIVERSITY EXAMINATION FOR THE DIPLOMA IN  
COMMUNITY HEALTH AND DEVELOPMENT**

**2<sup>nd</sup> YEAR 2<sup>nd</sup> SEMESTER 2022/2023 ACADEMIC YEAR**

**MAIN CAMPUS**

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**COURSE CODE:** HDC 2223

**COURSE TITLE:** BIostatISTICS

**EXAM VENUE:** STREAM:

**DATE:** EXAM SESSION:

**TIME: 3 HOURS**

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**Instructions:**

- 1. Answer all the questions in Section A and B, and any 2 questions in Section C.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**Section A: Answer all the questions in this section [10marks]**

1. Failing to reject the null hypothesis when it is false is:
  - A. Alpha
  - B. Type I error
  - C. Beta
  - D. Type II error
  
2. Your local police force wants to install cameras that can "catch" drivers who run red lights. They choose a busy intersection, install a test camera, and determine whether each car stops safely or "runs" the light. Choose the correct scale of measurement.
  - A. Approximately interval
  - B. Ordinal
  - C. Interval
  - D. Nominal
  
3. A study was conducted into the influence of spaying of bitches on their subsequent development of urinary incontinence. Young adult bitches presenting for spaying were randomly allocated to immediate ovariohysterectomy or to a deferred operation 6 months later. The bitches were followed over the 6 months. What type of variable is 'development of urinary incontinence'? **[1mark]**
  - A. Qualitative variable
  - B. Quantitative variable
  - C. Categorical variable
  - D. Binary variable

Questions 2 and 3 are based on the following sample of ages (in months) of 18 children at a day care: 36, 42, 18, 32, 22, 22, 25, 29, 30, 31, 19, 24, 35, 29, 26, 36, 24, 28

4. What is the standard deviation of the age of children? **[1mark]**
  - A. 6.42
  - B. 41.44
  - C. 41.24
  - D. 6.24
  
5. The median age of the children is? **[1mark]**
  - A. 31.5
  - B. 28.2
  - C. 30.5
  - D. 28.5
  - E. 31
  
6. Your local police force wants to install cameras that can "catch" drivers who run red lights. They choose a busy intersection, install a test camera, and determine whether each car stops safely or "runs" the light. Choose the correct scale of measurement. **[1mark]**
  - A. Approximately interval
  - B. Ordinal

- C. Interval
  - D. Nominal
  - E. Ratio
7. Measures of central tendency are? **[1mark]**
- a) inferential statistics that identify the best single value for representing a set of data.
  - b) descriptive statistics that identify the best single value for representing a set of data.
  - c) inferential statistics that identify the spread of the scores in a data set.
  - d) descriptive statistics that identify the spread of the scores in a data set.
8. Given the following data set, what is the value of the median? [ 2 4 3 6 1 8 9 2 5 7 ] **[1mark]**
- A. 2
  - B. 4.7
  - C. 4.5
  - D. 10
9. Which of the following is not a characteristic of the mean? **[1mark]**
- A. It is affected by extreme scores.
  - B. It minimizes the sum of squared deviations.
  - C. The sum of the deviations about the mean is 0.
  - D. It is best used with ordinal data.
10. A measure of central tendency tells us, using a single value, the best representation for an entire set of scores. A measure of variability tells us? **[1mark]**
- A. if the high and low extreme scores cancel each other out.
  - B. if the mean is greater than the mode.
  - C. how well the measure of central tendency represents the entire set of scores.
  - D. whether or not to compute percentiles.

**Section B: Answer all the questions in this section [20marks]**

1. Suppose that children aged 4-10 years sleep, on average, 590 minutes a night. A study is undertaken to assess whether autistic children of the same age have shorter sleep duration. State the null and alternative hypotheses that would be appropriate for this study **[6 marks]**
2. Chemical and manufacturing plants sometimes discharge toxic-waste materials such as DDT into the nearby lake. These toxins can adversely affect the marine animals. A PhD Student pursuing a degree in medical laboratory science recently conducted a study of fish in Lake Victoria. A total of 140 fishes were sampled, and the following variables were measured for each **[4 marks]**
  - a. Classify each of the five-variable measured as qualitative or quantitative
    - I. Beaches where each fish was captured
    - II. Species (Tilapia, Mudfish, Nile perch)
    - III. Length (cm)
    - IV. Weight (grams)
3. Define what is median and when to use it? **[5 marks]**
4. A study of school children and adolescents in the Democratic Republic of Congo showed the following summary statistics for weight (kg) in 11-year-old boys and girls:  
Boys: mean=25.1 kg SD=3.7 kg  
Girls: mean=24.2 kg SD=2.8 kg

Assume for the purposes of this exercise that weight in each of these two groups is normally distributed.

- A. What are characteristics of a normal distribution curve? [ **3 marks**]
- B. What is the median weight in boys and in girls? The mode? [ **2 mark**]

**Section C: Answer any 2 questions in this section 30 marks**

- 1. With graphics, briefly explain the relationship between the measures of central tendency (symmetric distribution, positively and negatively skewed) [ **15 marks**]
- 2. With examples, describe measures of central tendency
- 3. The average test in a certain statistics class was **74** with a standard deviation of **8**. There are **2000** students in this class. Use the empirical rule to answer the following questions. Use this statement to answer the following questions:
  - A. What percentage of students scored less than 58? [ **15 marks**]
  - B. What is the probability that a student scored between 66 and 82 on the exam? [ **5 marks**]
  - C. How many students scored at most 90? [ **5 marks**]
  - D. What percentage of students scored at least 66? [ **5 marks**]