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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2020/2021 ACADEMIC YEAR THREE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: STA 300**

**COURSE TITLE: BIOSTATISTICS**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 10/10/2021 TIME: 3.00-5.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of THREE (3) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Define biostatistics
2. Differentiate between the descriptive and inferential statistics **[3 marks]**
3. A doctor selected every 10th file from medical charts arranged alphabetically to estimate the percentage of patients who had not visited clinic during the past 24 months. Name the type of sampling used and support your answer with reasons. **[3 marks]**
4. The table below shows values of fecundity (rate of reproduction) of 50 fishes of a species of fish in a frequency table.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | 1-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 |
| No. of students | 3 | 11 | 7 | 4 | 15 | 0 | 7 | 3 |

Use the given data to compute the following

1. Mean
2. Median
3. Standard deviation
4. Quartile deviation **[9 marks]**
5. Discuss four scales/levels of measurement of statistical data  **[4 Marks]**
6. Assume that a population is composed of 900 elements with a mean of 20 units and a standard deviation of 12. What is the standard error of the sampling distribution if n=36 and if n=64 **[3 marks]**
7. Estimate the lower quartile, 4th deciles and the 85th percentile for the frequency table below.  **[6 marks]**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Class | 11-14 | 15-18 | 19-22 | 23-26 | 27-30 | 21-34 |
| Frequency | 10 | 14 | 20 | 16 | 12 | 8 |

1. Hospital records shows that 12% of all patients are admitted for surgical treatment, 16% are admitted for obstetrics and 2% receive both obstetrics and surgical treatment. If a new patient is admitted to the hospital, what is the probability that the patient will be admitted either for surgery, obstetrics or both?  **[3 marks]**

**QUESTION TWO**

1. Distinguish between mutually exclusive events and independent events **[2 marks]**
2. A game is played as follows: throw a fair four sided die and he scores eight times the number that faces down unless it is a 4. If it is four, you are given a second chance in which you score only four times the number that faces down. Let X be a random variable denoting the score for each player. Represent this information in a tree diagram showing the value of X and the corresponding probability hence or otherwise find the mean of the scores **[5 Marks]**
3. Use the Bowley’s coefficient of skewness and the percentile coefficient of skewness for the data below and interpret the results **[6 Marks]**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Class | 1-4 | 5-8 | 9-12 | 13-16 | 17-20 | 21-24 |
| Frequency | 10 | 14 | 20 | 16 | 12 | 8 |

(d) Two random sample were drawn from two normal populations and their values are

A: 364, 366, 374, 378, 382, 385, 387, 392, 393, 395, 397 **[7 marks]**

B: 366, 367, 375, 376, 382, 384, 388, 390, 392

Test whether the two population have the same variance at 5% level of significant?

**QUESTION THREE**

1. Define the following terms
2. Level of significance
3. Hypothesis
4. Type I error **[6 Marks]**

(b) A sample of ten plants gave the following shoot lengths 10.4, 21.6, 11.9, 12.0, 14.6, 11.9, 19.2, 11.4, 22.6, 10.2. An earlier study reported that the mean shoot length is 15cm. Test whether the experimental data confirms the old view at 1% level of significance? **[7 Marks]**

(c) In a clinical treatment, the patients were tested to see the effects of a potential hypertensive drugs. The 50 patients were assigned to receive active drug and other 50 as placebo at random. Their response to treatment was categorized as favorable or unfavorable. The data is given in the table below.

|  |  |  |
| --- | --- | --- |
| Treatment  | Response | Total  |
| Unfavorable | Favorable  |
| Placebo  | 41 | 9 | 50 |
| Drug | 16 | 34 | 50 |
| Total | 57 | 43 | 100 |

Test the hypothesis that a drug has a significant effect. Use $α=0.05.$ **[7 Marks]**

**QUESTION FOUR**

1. A perfect well and balanced coin was tossed six times. Determine the probability of getting
2. Exactly four heads
3. More than four heads
4. Not more than four heads **[8 Marks]**
5. It is known that the average number of births per week in a certain hospital is 3. Determine the probability that there will be 2 or more births in any given week **[4 Marks]**
6. To study the differences between serum uric acids levels in patients with and without mongolism,

 a sample of 12 individuals with mongolism was studied. The study yielded a mean of $x\_{1}=\frac{4.5mg}{100mL}.$ In another hospital a sample of 15 normal individuals of the same age and sex was found to have mean of $x\_{2}=3.4\frac{mg}{100mL}. $In case, the values of these two population are normally distributed with a variance equal to 1. Find the 95 percent confidence interval for $μ\_{1}-μ\_{2}$ **[8 Marks]**

**QUESTION FIVE**

1. The following data represents age at immunization in months for infants seen during a certain month by two pediatricians practicing in Garissa County.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pediatrician 1 | 13.2 | 11.1 | 17.2 | 19.3 | 8.1 | 13.9 | 9.2 | 12.7 |
| Pediatrician 2 | 9.4 | 10.2 | 8.7 | 10.3 | 14.1 | 12.6 | 16.2 |  |

Use the rank sum test to verify whether or not these samples come from populations with identical distributions. **[7 marks]**

1. Find the coefficient of correlation between the height of the fathers and sons from the following data and hence determine the coefficient of determination **[6 Marks]**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Height of Fathers (x) | 65 | 63 | 57 | 64 | 68 | 62 | 70 |
| Height of Sons (y) | 68 | 66 | 68 | 65 | 69 | 66 | 72 |

1. Determine the equation for the line of best fit from the data given below **[7 Marks]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| (x) | 8 | 4 | 5 | -1 |
|  (y) | -2 | 0 | 2 | 6 |