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**KENYA METHODIST UNIVERSITY**

**END OF 1ST TRIMESTER 2018 (PT) EXAMINATION**

**SCHOOL : SCIENCE AND TECHNOLOGY**

**DEPARTMENT : PURE AND APPLIED SCIENCES**

**UNIT CODE : MATH 231**

**UNIT TITLE : BIOSTATISTICS**

**TIME : 2 HOURS**

**INSTRUCTIONS**

*Answer* ***question 1*** *and any* ***other two*** *questions*.

* *Scientific calculators are allowed for this paper*
* *Some basic formulas are attached at the back of this paper.*

**QUESTION 1 (30 MARKS)**

1. Define the following terms;
   1. Event
   2. Sample space
   3. Critical region [6 Marks]
      1. In a Biostatistics class, there are 17 women and 3 men. If a class representative and the deputy are to be picked from this class, find the following probabilities.
2. Both will be of the same gender
3. A man will be class rep deputized by a lady [6 Marks]
   * 1. It was found that 60% of American victims of health care fraud are senior citizens. If 10 victims are randomly selected, find the probability that exactly 3 are senior citizens.

*Source: 100% American by Daniel Evan Weiss.* [6 Marks]

* + 1. A manufacturer finds that although he promises delivery of drugs to clinics 7 weeks, the time he takes to deliver to customers is approximately normally distributed with a mean of 6 weeks and a standard deviation of 2 weeks. Find what proportion of customers receive their deliveries late? [6 Marks]
    2. In a sample survey of 100 male municipal workers, the mean systolic blood pressure was 126 mmHg and a standard deviation of 12 mmHg. Calculate a 95% confidence interval for the mean systolic BP. [6 Marks]

**QUESTION 2 (20 Marks)**

1. If a couple wish to have a only three children and they wish to know all the possibilities they have, as a nurse who has done statistics, list all possible outcomes the couple could get. Find the probability of getting atleast a boy. State you assumption. [8 Marks]
2. If a hospital receives an average of 6 ( patients who are on critical condition, what is the probability that it will receive
   1. 4 patients on a critical condition on any given day?
   2. 10 Patients on a critical conditions over any 2 consecutive days [6 Marks]
3. Assuming there are no records of school fees defaulter at KEMU University-Mombasa campus, and the accountant would like to know the mean default rate, determine the number of files required in order to obtain a 95% confidence interval for the population mean  if the desired width of the confidence interval is 100 students on either side of the sample mean. The estimated standard deviation is 500 students. [6 Marks]

**.QUESTION 3 (20 Marks)**

1. The mean number of accident per month at a certain intersection is 3. What is the probability that in any given month 4 accidents will occur at this intersection? [4 Marks]
2. In any surgery performed in a certain hospital, there is 70% survival. If 10 patient are selected at random out of those waiting for surgery find the following probabilities,
   * 1. Exactly five patients will successful (survive).
     2. At least 9 patient will survive. [6 Marks]
3. The average age of a vehicle registered in Kenya is 8 years (96 months). Assume the standard deviation is 16 months. If a random sample of 36 vehicles is selected, find the probability that the mean of their age is between 90 and 100 months. [6 Marks]
4. The test statistics for t- test is 1.7 (upper-tailed test) what will be your decision rule at 5% level of significance if the sample size is 16? [4 Marks]

**QUESTION 4 (20 Marks)**

1. In each of the following situations, state whether it is a correctly stated hypothesis testing problem and why? [6 Marks]
2. 
3. 
4. 
5. Find the 95% confidence interval for the population mean given the data values below,

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 12.23 | 16.56 | 4.39 | 11.59 | 14.64 | 4.78 |
| 2.27 | 12.77 | 2.76 | 1.91 | 7.92 | 18.13 |
| 1.47 | 12.24 | 73.25 | 1.42 | 3.17 | 5.01 |
| 21.58 | 13.19 | 9.16 | 8.74 | 1.06 | 2.42 |
| 2.89 | 1.24 | 2.17 | 6.69 | 40.22 | 16.85 |

[6 Marks]

1. The advisor of Ecology club at a large college believes that the group consists of 10% freshmen, 20% sophomores, 40% juniors and 30% seniors. The membership for the club this year consisted of 14 freshmen, 19 Sophomores, 51 juniors and 16 seniors. At  test the advisors conjecture. [8 Marks]