[](http://50years.ksu.edu.sa/)Department of Statistics & Operations Research



College of Science, King Saud University

**STAT 109**

*First Midterm Examination*

|  |  |  |  |
| --- | --- | --- | --- |
| اسم الطالب |  | | |
| الرقم الجامعي |  | رقم التحضير |  |
| رقم الشعبة |  | اسم الدكتور |  |

* Mobile Telephones are not allowed in the classrooms.
* Time allowed is **90 Minutes**.
* Answer all questions.
* Choose the nearest number to your answer.
* WARNING: **Do not copy answers from your neighbors. They have different questions forms.**
* For each question, put the code (**Capital Letters**) of the correct answer in the following table beneath the question number. **Do not use pencils or red pens.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **B** | **B** | **C** | **B** | **A** | **D** | **B** | **A** | **D** | **B** |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **C** | **A** | **D** | **B** | **A** | **B** | **B** | **D** | **B** | **A** |
| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| **C** | **A** | **C** | **C** | **A** | **D** | **B** | **A** | **C** | **A** |

**Question 1:**

1. Which of the following is an example of a statistic:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | the population variance | B) | the sample median | C) | the population mean | D) | the population mode |

1. Which of the following are examples of measures of dispersion:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | the median and the mode | B) | the range and the variance | C) | the parameter and the statistic | D) | the mean and the variance |

**Question 2:**

For a sample of 60 women having children, we measure the age (in years). Complete the following table to give the values of the items mentioned:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Class Interval | True class Interval | Midpoint | Frequency | Relative Frequency |
| 15 - 24 | 14.5 – 24.5 | 19.5 | 3 | 0.05 |
| 25 - 34 | 24.5 – 34.5 | 29.5 | **D** | 0.20 |
| 35 – 44 | 34.5 - 44.5 | **C** | 18 | **F** |
| **A** | 44.5 – 54.5 | 49.5 | 15 | 0.25 |
| 55 - 64 | **B** | 59.5 | **E** | 0.20 |

1. The value of A:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 40.5 – 50.5 | B) | 44 - 54 | C) | 45 - 54 | D) | 44.5 – 54.5 |

1. The value of B:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 40.5 – 50.5 | B) | 54.5 – 64.5 | C) | 54 - 64 | D) | 44.5 – 54.5 |

1. The value of C:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 39.5 | B) | 28.5 | C) | 29 | D) | 59 |

1. The value of D:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 9 | B) | 10 | C) | 11 | D) | 12 |

1. The value of E :

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0 | B) | 12 | C) | 10 | D) | 11 |

1. The value of F:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.30 | B) | 0.15 | C) | 0.35 | D) | 0.25 |

**Question 3:**

If the number of visits to the clinic made by 8 pregnant women in their pregnancy period is:

12 15 16 12 15 16 12 14

Then,

1. The type of the variable is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | continuous | B) | ordinal | C) | nominal | D) | discrete |

1. The sample mean is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 11 | B) | 14 | C) | 8 | D) | 15 |

1. The sample standard deviation is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 4.012 | B) | -2.450 | C) | 1.773 | D) | 2.524 |

1. The sample median is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 14.5 | B) | 15.5 | C) | 16.5 | D) | 15 |

1. The coefficient of variation is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 70 % | B) | 2.5 % | C) | 28.25 % | D) | 12.66 % |

1. The range is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 11 | B) | 4 | C) | 6 | D) | 28 |

**Question 4:**

Suppose that we have two events A and B such that:  ,  ,



1. The probability  is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | **0.7** | B) | 0.4 | C) | 0.5 | D) | 0 |

1. The probability  is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.51 | B) | 0.20 | C) | 0.40 | D) | 0.60 |

1. The probability  is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.51 | B) | **0.4**0 | C) | 0.20 | D) | 0.30 |

1. The events A and B are:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | disjoint | B) | dependent | C) | equal | D) | **Independent** |

**Question No. 5**

A group of people is classified by the amount of fruits eaten and the health status:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fruits Eaten  Health Status | Few (F) | Some (S) | Many (M) | Total |
| Poor (B) | 80 | 35 | 20 | 135 |
| Good (G) | 25 | 110 | 45 | 180 |
| Excellent (E) | 15 | 95 | 75 | 185 |
| Total | 120 | 240 | 140 | 500 |

If one of these people is randomly chosen give:

1. The event “(eats few fruits) and (has good health)“, is defined as.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | F ∪ Gc | B) | F ∩ G | C) | F ∪ E | D) | S ∪ E |

1. P(B ∪ M) =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | **0.51** | B) | 0.0.28 | C) | 0.27 | D) | 0.04 |

1. P(G ∩ S) =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.48 | B) | 0.36 | C) | **0.22** | D) | 0.62 |

1. P(Ec) =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | **0.63** | B) | 0.37 | C) | 0.50 | D) | 1 |

1. P(G | S) =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.6111 | B) | 0.2200 | C) | **0.4583** | D) | 0.36 |

1. P(M | E) =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.6111 | B) | 0.2200 | C) | **0.405** | D) | 0.36 |

**Question No. 6**

The following table shows the results of a screening test evaluation in which a random sample of 43 subjects with the disease and an independent random sample of 28 subjects without the disease participated:

|  |  |  |
| --- | --- | --- |
|  | Disease confirmed (D) | Disease not confirmed () |
| Positive test (T) | 38 | 10 |
| Negative test () | 5 | 18 |

1. The probability of false positive of the test is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **A)** | 0.3571 | B) | 0.2083 | C) | 0.7916 | D) | 0.2173 |

1. The probability of false negative of the test is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.3571 | B) | 0.7826 | C) | 0.2173 | **D)** | 0.1163 |

1. The sensitivity value of the test is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.2173 | B) | 0.8837 | C) | 0.6429 | D) | 0.3571 |

1. The specificity value of the test is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.6429 | B) | 0.3571 | C) | 0.2173 | D) | 0.2535 |

Suppose it is known that the rate of the disease is 0.113,

1. The predictive value positive of the a symptom is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | 0.9797 | B) | 0.5714 | C) | 0.2397 | D) | 0.34591 |

1. The predictive value negative of the a symptom is:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| A) | **0.9795** | B) | 0.5714 | C) | 0.2397 | D) | 0.34591 |