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|  | Department of Statistics & Operations Research  College of Science, King Saud University  STAT 109  First Midterm Exam, |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Student's Name (In Arabic) |  | Section's Number: |  |
| Student's Number |  | Attendance number: |  |
| Teacher's Name: |  |  |  |

* There are 30 multiple choice questions.
* Time allowed is 90 minutes. (1.5 Hour).
* Answer all questions.
* Choose the nearest number to your answer.
* Mobile telephones are not allowed in the classrooms.
* WARNING: Do not copy answers from your neighbors. They have different question forms.
* For each question, put the code of the correct answer in the following table beneath the question number.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **D** | **B** | **C** | **B** | **C** | **B** | **D** | **B** | **B** | **A** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **A** | **A** | **C** | **B** | **D** | **A** | **D** | **B** | **C** | **A** |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| **C** | **A** | **D** | **C** | **A** | **D** | **C** | **B** | **A** | **D** |

|  |  |
| --- | --- |
| **Total Degree:** |  |

**Q. 1- 6**⏩⏩ suppose that we have a random sample of observations as given in the following: 9, 6, 7, 15, 10, 12, 16, 9, 5, 11.

Then:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | The median is: | | | | | | | | | | | | | | | | | |
|  | | | (A) | | 10.5 | | (B) | | 15 | | (C) | | 12.5 | | (D) | | 9.5 | |
|  | The range is: | | | | | | | | | | | | | | | | | |
|  | | | (A) | | 10 | | (B) | | 11 | | (C) | | 15 | | (D) | | 5 | |
|  | The mean is: | | | | | | | | | | | | | | | | | |
|  | | | (A) | | 15 | | (B) | | 9.5 | | (C) | | 10 | | (D) | | 12.5 | |
|  | | The standard deviation is: | | | | | | | | | | | | | | | | |
|  | | | | (A) | | 4.63 | | (B) | | 3.62 | | (C) | | 8.72 | | (D) | | 9.31 |
|  | The mode is: | | | | | | | | | | | | | | | | | |
|  | | | (A) | | 10 | | (B) | | 15 | | (C) | | 9 | | (D) | | No mode | |
|  | The coefficient of variation (C.V.) is: | | | | | | | | | | | | | | | | | |
|  | | | (A) | | 232.7% | | (B) | | 36.21% | | (C) | | 213.24% | | (D) | | 39.59% | |

**Q. 7- 11**⏩⏩Answer the following:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | The biggest advantage of the standard deviation over the variance is: | | | | | |
|  | | | | (A) | | The standard deviation is always greater than the variance. |
|  | | | | (B) | | The standard deviation is calculated with the median instead of the mean. |
|  | | | | (C) | | The standard deviation is better for describing the qualitative data. |
|  | | | | (D) | | The standard deviation has the same units as the original data. |
|  | Parameters and statistics: | | | | | |
|  | | | | (A) | Describe the same group of individuals. | |
|  | | | | (B) | Describe the population and the sample, respectively. | |
|  | | | | (C) | Describe the sample and the population, respectively. | |
|  | | | | (D) | None of these. | |
|  | | | Which of the following location (central tendency) measures is affected by extreme values? | | | |
|  | | | | (A) | | Median |
|  | | | | (B) | | Mean |
|  | | | | (C) | | Variance |
|  | | | | (D) | | Range |
|  | | Which of the following measures can be used for the blood type in a given sample? | | | | |
|  | | (A) | | | Mode | |
|  | | (B) | | | Mean | |
|  | | (C) | | | Variance | |
|  | | (D) | | | Range | |
|  | | If has mean , then and =4 has mean: | | | | |
|  | | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | (A) | equal 4 | (B) | less than 4 | (C) | greater than 4 | (D) | None of this | | | | | |

**Q. 12 - 17**⏩⏩ The following table gives the distribution of the ages of a sample of 50 patients who attend a dental clinic.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cumulative Frequency | Less than |  | Relative frequency | Frequency | Age intervals (in years) |
| 0 | 10 |  | - | 4 | 10 - 15 |
| 4 | 16 |  | - | 8 | 16 - 21 |
| y | 22 |  | 0.32 | *z* | 22 - 27 |
| -- | 28 |  | - | - | 28 - 33 |
| -- | 34 |  | - | 10 | 34 - 39 |
| x | 40 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | The class width is: | | | | | | | | |
|  | | (A) | 6 | (B) | 10 | (C) | 150 | (D) | 19 |
|  | The value of x is: | | | | | | | | |
|  | | (A) | 22 | (B) | 28 | (C) | 50 | (D) | 10 |
|  | The value of y is: | | | | | | | | |
|  | | (A) | 4 | (B) | 12 | (C) | 19 | (D) | 150 |
|  | The value of z is: | | | | | | | | |
|  | | (A) | 14 | (B) | 12 | (C) | 50 | (D) | 16 |
|  | Percent of the patients with age between 16 and 21 is: | | | | | | | | |
|  | | (A) | 16% | (B) | 8% | (C) | 20% | (D) | 32% |
|  | The 5th interval midpoint is: | | | | | | | | |
|  | | (A) | 38 | (B) | 52 | (C) | 27 | (D) | 36.5 |

**Q. 18-24**⏩⏩ The following table classifies a sample of individuals according to gender and period of time (in years) attendance in the college:

|  |  |  |  |
| --- | --- | --- | --- |
| College Attended | Gender | | |
| Male | Female | Total |
| None | 12 | 41 | 53 |
| Two Years | 14 | 63 | 77 |
| Three Years | 9 | 49 | 58 |
| Four Years | 7 | 50 | 57 |
| Total | 42 | 203 | 245 |

Suppose we select an individual at random, then:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | The probability that the individual is male is: | | | | | | | | | | | | | | | |
|  | | | (A) | | 0.8286 | | (B) | | 0.1714 | | (C) | | 0.0490 | (D) | 0.2857 | |
|  | The probability that the individual did not attend college (None) and female is: | | | | | | | | | | | | | | | |
|  | | | (A) | | 0.0241 | | (B) | | 0.0490 | | (C) | | 0.1673 | (D) | 0.2163 | |
|  | The probability that the individual has three year or two year college attendance is: | | | | | | | | | | | | | | | |
|  | | | (A) | | 0.551 | | (B) | | 0.0939 | | (C) | | 0.4571 | (D) | 0 | |
|  | | If we pick an individual at random and found that he had three year college attendance, the probability that the individual is male is: | | | | | | | | | | | | | | |
|  | | | | (A) | | 0.0367 | | (B) | | 0.2143 | | (C) | 0.1552 | (D) | 0.1714 |
|  | The probability that the individual is not a four year college attendance is: | | | | | | | | | | | | | | | |
|  | | | (A) | | 0.7673 | | (B) | | 0.2327 | | (C) | | 0.0286 | (D) | 0.1429 | |
|  | The probability that the individual is a two year college attendance or male is: | | | | | | | | | | | | | | | |
|  | | | (A) | | 0.0571 | | (B) | | 0.8858 | | (C) | | 0.2571 | (D) | 0.4286 | |
|  | The events: the individual is a four year college attendance and male are: | | | | | | | | | | | | | | | |
|  | | | (A) | | Mutually exclusive | | (B) | | Independent | | (C) | | Dependent | (D) | None of these | |

**Q. 25-30**⏩⏩ Suppose that the ministry of health intends to check the reliability of the central Diabetic Lab in Riyadh. A sample persons with Diabetic disease () and another without the disease () had the Lab tests and the results are given below:

|  |  |  |
| --- | --- | --- |
|  | Present () | Absence () |
| Positive () | 950 | 40 |
| Negative () | 25 | 640 |

Then:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | The probability of false negative result is: | | | | | | | | | |
|  | | | (A) | 0.0256 | (B) | 0.9412 | (C) | 0.9744 | (D) | 0.0588 |
|  | The probability of false positive result is: | | | | | | | | | |
|  | | | (A) | 0.0256 | (B) | 0.9412 | (C) | 0.9744 | (D) | 0.0588 |
|  | The sensitivity of the test is: | | | | | | | | | |
|  | | | (A) | 0.0256 | (B) | 0.9412 | (C) | 0.9744 | (D) | 0.0588 |
|  | | The specificity of the test is: | | | | | | | | |
|  | | | (A) | 0.0256 | (B) | 0.9412 | (C) | 0.9744 | (D) | 0.0588 |
| Assume that the true percentage of Diabetic patients in Riyadh is 25%. then | | | | | | | | | | |
|  | The predictive value positive of the test is: | | | | | | | | | |
|  | | | (A) | 0.847 | (B) | 0.924 | (C) | 0.991 | (D) | 0.695 |
|  | The predictive value negative of the test is: | | | | | | | | | |
|  | | | (A) | 0.195 | (B) | 0.982 | (C) | 0.847 | (D) | 0.991 |

*End of the Exam --- Good Luck*