

Department of Statistics & Operations Research

College of Science

King Saud University

STAT – 109: Biostatistics

First Mid-Term Exam

Student's Name (In Arabic):

Student's Number: Attendance Number:

Section's Number:

Instructions:

There are 30 multiple choice questions.

Time allowed is 90 minutes. (1.5 Hour).

For each question, put the code of the correct answer in the following table beneath the question number. Please, use capital letters: A, B, C, and D.

Do not copy answers from your neighbors; they have different question forms.

Mobile Telephones are not allowed in the classroom.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| A | A | B | D | A | Any answer | Any answer | D | D | D |

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

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

1. Which of the following measures is not affected by the extreme values?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Median | 1. Mean | 1. Variance | 1. Range |

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1. The number of students admitted in College of Medicine in King Saud University is a variable of type

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Discrete | 1. Qualitative | 1. Continuous | 1. nominal |

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1. Which of the following location (central tendency) measures is affected by extreme values?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Range | 1. Mean | 1. Median | 1. Mode |

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1. Which of the following measures can be used for the blood type in a given sample?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Median | 1. Mean | 1. Variance | 1. Mode |

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1. A mean of a population is called …………….

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Parameter | 1. statistic | 1. Median | 1. Mode |

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Question (6-11):

The following table gives the age distribution for the number of deaths in New York State due to accidents for residents age 25 and older.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Age (Years) | Number of Deaths | Cumulative Frequency | True Class Interval | Relative Frequency | Cumulative Relative Frequency | Mid-Point |
| 25 – 34 | 393 | 393 | 24.5 – 34.5 | 0.1188 | 0.1188 | 29.5 |
| 35 – 44 | 514 | 907 | 34.5 – 44.5 | 0.1554 | 0.2742 | 39.5 |
| 45 – 54 | B | 1367 | ------ | 0.1104 | 0.3882 | 49.5 |
| 55 – 64 | 341 | 1708 | 54.5 – 64.5 | 0.1031 | 0.4913 | 59.5 |
| 65 – 74 | A | 2073 | 64.5 – 74.5 | 0.1391 | C | 69.5 |
| 75 – 84 | 616 | 2689 | ------ | 0.1863 | 0.8167 | 79.5 |
| 85 – 94 | 618 | 3307 | ------ | 0.1869 | 1.0000 | 89.5 |
| Total | ------ |  | ------ | ------ |  |  |

1. The value of A is …………..

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 365 | 1. 341 | 1. 514 | 1. 616 |

1. The value of B is …………………

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 460 | 1. 441 | 1. 414 | 1. 406 |

1. The true class interval of the highest frequency is ………..

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 74.5 – 84.5 | 1. 44.5 – 54.5 | 1. 64.5 – 74.5 | 1. 84.5 – 94.5 |

1. The value of the gap (jump) between (non-true) class intervals is ……..

|  |  |  |  |
| --- | --- | --- | --- |
| 1. No gaps | 1. 0.5 | 1. 0 | 1. 1 |

1. The true class interval that has the lowest relative frequency is …………

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 25 – 34 | 1. 45 – 54 | 1. 55 – 64 | 1. 54.5 – 64.5 |

1. The value of C is ……………

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.6101 | 1. 0.6130 | 1. 0.6304 | 1. 0.6011 |

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Question (12-18): A study was conducted to determine if doctor-patient race concordance was associated with greater satisfaction with care. Toward that end, they collected a national sample of African-American, Caucasian, Hispanic, and Asian-American respondents. The following table classifies the race of their subjects as well as the race of their physician.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Patient’s Race | | | | |
| Physician’s Race | Caucasian (C) | African-Amer. ( M) | Hispanic (PH) | Asian-Amer. (D) | Total |
| White (W) | 779 | 436 | 406 | 175 | 1796 |
| African-American (F) | 14 | 162 | 15 | 5 | 196 |
| Hispanic (H) | 19 | 17 | 128 | 2 | 166 |
| Asian/Pacific-Islander (P) | 68 | 75 | 71 | 203 | 417 |
| Other (O) | 30 | 55 | 56 | 4 | 145 |
| Total | 910 | 745 | 676 | 389 | 2720 |

1. What is the probability that a randomly selected subject will have an Asian/Pacific-Islander physician?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.1133 | 1. 0.1233 | 1. 0.1533 | 1. 0.1733 |

1. Given that the patient is an African-American what is the probability that he will have an African-American physician?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.1175 | 1. 0.1275 | 1. 0.2174 | 1. 0.1875 |

1. What is the probability that a randomly selected subject in the study will be Asian-American and have an Asian/Pacific-Islander physician?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.0746 | 1. 0.0275 | 1. 0.0847 | 1. 0.1875 |

1. The two events F and M are

|  |  |  |  |
| --- | --- | --- | --- |
| 1. independent | 1. disjoint | 1. mutually exclusive | 1. dependent |

1. The probability that a subject chosen at random in the study does not have a white physician is …….

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.3397 | 1. 0.003397 | 1. 0.033879 | 1. 0.0097 |

1. Given that the subject is Caucasian, what is the probability that the subject has not a white physician?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.1220 | 1. 0.1660 | 1. 0.1550 | 1. 0.1440 |

1. Given that the subject is not Caucasian, what is the probability that the subject has a white physician?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.6019 | 1. 0.5619 | 1. 0.5818 | 1. 0.5919 |

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Question (19-22):

The data for measurements of the left ischia tuberosity (in mm Hg) for the SCI and control groups are shown below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Control | 131 | 115 | 124 | 131 | 122 |
| SCI | 60 | 150 | 130 | 180 | 163 |

1. The mean for the control group is …………….

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 125.10 | 1. 128.10 | 1. 124.60 | 1. 127.10 |

1. The variance of the SCI group is ………….

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 2025.10 | 1. 2167.8 | 1. 2026.10 | 1. 2037.10 |

1. The unit of coefficient of variation for SCI group is

|  |  |  |  |
| --- | --- | --- | --- |
| 1. mm Hg | 1. Hg | 1. mm | 1. Unit-less |

1. Which group has more variation

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Control group | 1. SCI   group | 1. Both groups have the same variation | 1. Cannot compare between their variations |

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Question (23-27): Some physicians performed a retrospective study of 71 knees scanned by MRI. One of the indicators they examined was the absence of the "bow-tie sign" in the MRI as evidence of a bucket-handle or "bucket-handle type" tears of the meniscus. In the study, surgery confirmed that 43 of the 71 cases were bucket-handle tears. The cases may be cross-classified by "bow-tie sign" status and surgical results as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Test Result | Tear Surgically Confirmed (D) | Tear Surgically Not Present | Total |
| Positive Test (Absent bow-tie- sign) (T) | 38 | 10 | 48 |
| Negative Test (bow-tie- sign present) () | 5 | 18 | 23 |
| Total | 43 | 28 | 71 |

1. Given that the case does not have tear surgically, what is the probability that the test is positive (false positive)?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.3571 | 1. 0.7135 | 1. 0.7153 | 1. 0.3157 |

1. Given that the case has a tear surgically, what is the probability that the test is negative (false negative)?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.1613 | 1. 0.1163 | 1. 0.6311 | 1. 0.3157 |

1. Given that the case has a tear surgically, what is the probability that the test is positive (sensitivity)?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.3878 | 1. 0.3788 | 1. 0.8837 | 1. 0.8387 |

1. Given that the test is positive, what is the probability that the case has a tear surgically (predictive value positive of the test)? [Take the rate of tear surgically, i.e., ]

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.2342 | 1. 0.2152 | 1. 0.5125 | 1. 0.1251 |

1. Given that the test is negative, what is the probability that the case does not have a tear surgically (predictive value negative of the test)?

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 0.0895 | 1. 0.9081 | 1. 0.8903 | 1. 0.9781 |

Question (28-30):

A study of 250 patients admitted to a hospital during the past year revealed that, on the average (mean), the patients lived 15 miles from the hospital.

1. The sample in the study is ………….

|  |  |  |  |
| --- | --- | --- | --- |
| 1. 250 patients | 1. 250 hospitals | 1. 250 houses | 1. 15 miles |

1. The population in this study is …………

|  |  |  |  |
| --- | --- | --- | --- |
| 1. Some patients admitted to the hospital during the past year | 1. all patients admitted to the hospital during the past year | 1. 250 patients admitted to the hospital during the past year | 1. 500 patients admitted to the hospital during the past year |

1. The variable of interest is of type …………

|  |  |  |  |
| --- | --- | --- | --- |
| 1. continuous | 1. discrete | 1. nominal | 1. Qualitative ordinal |

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