



Karachi Campus
Department Of Computer Sciences
Midterm-1 Examination Spring-2017

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| Name of Student: | | Student I.D.: | |
| Course: | MT-206 Probability & Statistics | Max. Points: | 70 |
| Date: | 20 February 2017 | Duration : | 1 Hour |

Instruction: Answer all questions on answer script.

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| Question 1: | Estimated time 10 minutes | 20 points |
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- (i) Which of the following is not a null set?
- $X = \{x : x^2 = 9 \text{ and } 2x = 4\}$
 - $Y = \{x : x \neq x\}$
 - $Z = \{x : x + 8 = 8\}$
 - None of these
- (ii) Which of the following constitute continuous variables?
- Anxiety rated on a scale of 1 to 5 where 1 equals not anxious, 3 equals moderately anxious and 5 equals highly anxious
 - Gender
 - Temperature
 - All of the above
- (iii) Which of the following could be considered as categorical variables?
- Gender
 - Brand of baked beans
 - Hair colour
 - All of the above
- (iv) Which of the following measures of central tendency are sensitive to extreme scores?
- Mode
 - Median
 - Mean
 - None of the above
- (v) How many committees of 3 men and 7 women can be selected from a group of 8 men and 10 women?
- ${}^8C_3 {}^{10}C_7$
 - ${}^8P_3 {}^{10}P_7$
 - ${}^{18}C_{10}$
 - None of these

(vi) How many three digit numbers with distinct digits can be formed without using the digits 0, 2, 3, 4, 5, and 6

- A. 24
- B. 100
- C. 64
- D. None of these

(vii) How many different words ending and beginning with a consonant can be formed with the letters of the word EQUATION

- A. 720
- B. 1440
- C. 4320
- D. None of these

(viii) A multiple-choice test consists of 15 questions, each permitting a choice of 5 alternatives. In how many ways may a student fill in the answers if they answer each question?

- A. 32768
- B. 5^{15}
- C. 5^{14}
- D. None of these

(ix) A restaurant offers a meal combo that consists of a beverage, a main course, and a dessert. There are 5 beverages, 6 main courses, and 4 desserts. How many meal combos are available?

- A. 15
- B. 20
- C. 120
- D. 30

(x) Which of the following statements is correct?

- A. The probability that A will not occur is probability of the complement of A
- B. An activity, which results in an outcome, is called an event
- C. The probability of an event is expressed in decimal form ranging from -1 to +1
- D. The sample space refers to all possible outcomes of an experiment

3 are correct

Question 2:

Estimated time 10 minutes

10 points

Exposure to microbial products, especially endotoxin, may have an impact on vulnerability to allergic diseases. The article Dust Sampling Methods for Endotoxin- An Essential, But Underestimated Issue (Indoor Air, 2006: 2027) considered various issues associated with determining endotoxin concentration. The following data on concentration (EU/mg) in settled dust for one sample of urban homes and another of farm homes was kindly supplied by the authors of the cited article.

U: 6.0 5.0 11.0 33.0 4.0 5.0 80.0 18.0 35.0 17.0 23.0
 F: 4.0 14.0 11.0 9.0 9.0 8.0 4.0 20.0 5.0 8.9 21.0

- (i) Determine the sample mean and median for each sample. How do they compare. Also discuss behavior of the shape of distribution.
- (ii) Determine the coefficient of variation (c.v) [Use calculator for computations]

Question 3:

Estimated time 10 minutes

10 points

Following table provide a frequency distribution, using limit grouping, for the days to maturity of 40 short-term investments,

| Days to Maturity | Frequency f |
|------------------|-------------|
| 30-39 | 3 |
| 40-49 | 1 |
| 50-59 | 8 |
| 60-69 | 10 |
| 70-79 | 7 |
| 80-89 | 7 |
| 90-99 | 4 |

- (i) Use the grouped-data formulas to estimate standard deviation of the days-to-maturity data.
- (ii) Construct a histogram and comment on its shape.

Question 4:

Estimated time 10 minutes

10 points

Material strength investigations provide a rich area of application for statistical methods. The article Effects of Aggregates and Microfillers on the Flexural Properties of Concrete (Magazine of Concrete Research, 1997: 8198) reported on a study of strength properties of high-performance concrete obtained by using superplasticizers and certain binders. The compressive strength of such concrete had previously been investigated, but not much was known about flexural strength (a measure of ability to resist failure in bending). The accompanying data on flexural strength (in MegaPascal, MPa) appeared in the article cited:

5.9 7.2 7.3 6.3 8.1 6.8 7.0 7.6 6.8 6.5 7.0 6.3 7.9 9.0
 8.2 8.7 7.8 9.7 7.4 7.7 9.7 7.8 7.7 11.6 11.3 11.8 10.7

- (i) Construct a stem-and-leaf display of the data.
- (ii) Construct a boxplot.

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| Question 5: | Estimated time 10 minutes | 10 points |
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An engineering firm is hired to determine if certain waterways in Virginia are safe for fishing. Samples are taken from three rivers.

- (i) List the elements of a sample space S, using the letters F for safe to fish and N for not safe to fish.
- (ii) List the elements of S corresponding to event E that at least two of the rivers are safe for fishing.
- (iii) Define an event that has as its elements the points {FFF, NFF, FFN, NFN}

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| Question 6: | Estimated time 10 minutes | 10 points |
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A certain factory operates three different shifts. Over the last year, 200 accidents have occurred at the factory. Some of these can be attributed at least in part to unsafe working conditions, whereas the others are unrelated to working conditions. The accompanying table gives the percentage of accidents falling in each type of accident-shift category

| | | Unsafe | Unrelated |
|--------------|--------------|-------------------|----------------------|
| | | Conditions | to Conditions |
| Shift | Day | 10% | 35% |
| | Swing | 8% | 20% |
| | Night | 5% | 22% |

Suppose one of the 200 accident reports is randomly selected from a file of reports, and the shift and type of accident are determined.

- (i) What are the simple events?
- (ii) What is the probability that the selected accident was attributed to unsafe conditions?
- (iii) What is the probability that the selected accident did not occur on the day shift?
- (iv) What is the probability that the selected accident occur on the day or night shift?

for assessment use only

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| Question: | 1 | 2 | 3 | 4 | 5 | 6 | Total |
| Points: | 20 | 10 | 10 | 10 | 10 | 10 | 70 |
| Score: | | | | | | | |