DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 23   Third Exam
Fall 2015   Due date: 11/11/2015

1. For the sample data $X = \{2, 15, 25\}$

   (a) (4 points) Find the sample mean $\bar{x}$.

   (b) (4 points) Find the sample standard deviation s.

   (c) (2 points) Would you say that the data is consistent with the mean? Explain using the C.V.

2. The following data relates pension contribution (x) in thousands of dollars to the percent of taxable income (y).

x	5	11	3.5
y	2	1.5	4

   (a) (3 points) Draw the scattered plot of the set of data.

   (b) (4 points) Using the graph would you estimate the correlation to positive, negative or zero? Explain your answer.

   (c) (3 points) Compute the coefficient r of linear correlation to support your guess in (b).

3. The following probability distribution represents the claim sizes (x) for an auto insurance policy.

x	2	3	4
P(x)	.2	.35	.45

   (a) (3 points) Sketch the bar graph of the distribution.

   (b) (3 points) Calculate the expected value of the distribution.

   (c) (4 points) Calculate the standard deviation.

4. The following table represents the distribution of students at a local school:

	Male	Female
Junior	18	20
Sophmore	10	12
Senior	16	18

   Find the probability that a randomly selected student is:

   (a) (2 points) A male (M)?

   (b) (2 points) A Sophmorore(SP)?

   (c) (2 points) not a Sophmore?

(d) (2 points) A junior (J)?

(e) (2 points) A junior and a senior (J and S)? How do you call this type of event?

(f) (2 points) A junior or a senior (J or S)? How do you call this type of event?

(g) (2 points) Junior and male (J and M)?

(h) (2 points) A junior or a male (J or M)?

(i) (2 points) Are the events "M=the selected student is a male" and "J=the selected student is a junior" mutually exclusive? Explain.

5. An entrance examination requieres two tests: Math and English. The probability of passing the English test is .45 (P(E)=.45). The probability of passing the Mathematic test is .55 $(P(M)) = .55$). Finally, the probability of passing the Math test for student that already pased the English is .87 $(P(M \mid E) = .87)$.

(a) (3 points) What is the probability of passing both tests P(M and E)?

(b) (3 points) What is the probability of passing successfully at least one of the two test P(M or E)?

(c) (3 points) What is the probability of passing English for students that already passed Math $(P(E \mid M))$?

(d) (3 points) Are the events "E=passing the English exam" and "M=passing the Math Exam" independent? Explain your answer.

6. Suppose that the probability of a hurricane in a calendar year is $p = .45$. Find the probability that, in a 12-year period, we have:

(a) (2 points) Exactly 5 hurricanes.

(b) (3 points) At least 7 hurricanes.

(c) (3 points) At most 2 huricanes.

(d) (4 points) Determine the expected value μ and the standard deviatio σ.

(e) (4 points) Compute part (c) using approximation with the normal distribution and finding $P(X < 2.5)$ for X being distributed $N(\mu, \sigma)$.

7. Sketch a graph that represents the following probabilities, when Z is distributed normal standard and find the actual probabilities

(a) (3 points) $P(z < 1.75)$

(b) (3 points) $P(z > 1.83)$

(c) (4 points) $P(-0.41 < z < 1.32)$

8. Let Z have a standard normal distribution. Given the following probability draw an appropriate diagram, shade the appropriate region and determine the value of Z_c.

(a) (3 points) $P(0 < Z < Z_c) = .3830$

(b) (3 points) $P(Z_c < Z < 0) = .2776$

9. The average salary for first-year teacher is $28,340$. If the distribution is approximately normal with $\sigma = 3250$, what is the probability that a randomly selected first-year teacher makes these salaries?

(a) (5 points) Less than $20,000$ a year

(b) (5 points) Between $20,000$ and $35,000$ a year.

102