BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 23   Fourth Exam

Fall 2015   Day (1 Hour and 50 minutes)

Directions: The exam totals 100 points. You _must_ show all your work in the provided space for full credit. Use the tables and formula sheets provided

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Print Name:_____

1. (14 points) For the sample data $X = \{2, 15, 25, 17, 8\}$

   (a) Find the median

   (b) Find the sample mean $\bar{x}$.

   (c) Find the sample standard deviation s.

2. (11 points) The following data relates pension contribution (x) in thousands of dollars to the percent of taxable income (y).

x	9	12	3.3	8	11.8	15	3.4
y	3.2	5.5	9.1	2.5	4	5.2	1

   (a) Plot the scatter plot of the set of data.

   (b) Based on the scatter diagram, would you estimate the correlation coefficient to be positive, negative or close to zero? Explain your answer.

3. (12 points) The following table represents the distribution of students at a local school:

	Male	Female
Junior	17	25
Sophmore	15	18
Senior	10	12

   Find the probability that a randomly selected student is:

   (a) A Male (M)?

   (b) Not a Junior (J)?

   (c) A Male and not a junior (M and no J)?

   (d) A Senior or a Male (S or M)?

   (e) A Junior given that you know it was a Male (J / M)?

4. (10 points) An entrance exam requieres two tests: Math and English. We know that students have a 38.7 % chance of passing the English test. The students also have a 44.2 % of chances of passing the Mathematics Test. For students that already pased the English, the chances of passing Math is 88.3 %.

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

(b) What is the probabillty that a student passes Math or English (M or E)?

5. (9 points) A couple has 8 kids. Consiering the boys and girls are equally likely, what is the probability that they have:

(a) No more that 3 girls.

(b) Calculate the expected value.

(c) Calculate standard deviation.

6. (19 points) Let x be a random variable representing the salary of first-year teacher. If we found that x has an approximate normal distribution with mean $32,340$ and standard deviation $\sigma = 2780$.

(a) What is the probability that a randomly selected first-year teacher makes more than $28,000$?

(b) Suppose that 36 teachers are selected at random, what is the probability that the mean salary $\bar{x}$ is more than $32,700$?

7. (10 points) Let X be a random variable representing the mileage of a new model of car. To study X, a random sample of 20 cars was tested. A sample mean $\bar{x} = 33.7$ mpg was found. The sample standard deviation is known to be $s = 1.6$ mpg. Find a 90% confidence interval for the average mileage of this model. Assume that the distribution of X is normal.

8. (15 points) A researcher reports that the average salary of assistant professors is more than $42,000$. A sample of 30 assistant professors has a mean salary of $43,260$. The standard deviation of the population is 5230. At $\alpha = 0.05$, test the claim that assistant professors earn more than $42,000.00$ a year.

(a) State the null and alternate hypothesis.

(b) What is the value of the sample test statistic ?

(c) Find the P-value of the test statistic or show the critical region on a graph.

(d) Based on your answers in parts (a), (b) and (c), will you reject or fail to reject the null hypothesis? Explain your answer.