

BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 23
Spring 2015

Fourth Exam
Day (2 Hours)

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

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	15
y	7.2	5.5	9.1	5.2

- (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
Sophomore	15	18
Senior	10	12

Find the probability that a randomly selected student is:

- (a) A Male (M)?
 - (b) A Junior (J)?
 - (c) A Junior and a Male (J and M)?
 - (d) A Junior or a Male (J or M)?
 - (e) A Junior given that you know it was a Male (J / M)?
4. (10 points) An entrance exam requires two tests: Math and English. The probability of passing the English test is .38 and the probability of passing the Math test for student that already passed the English is .88.

- (a) What is the probability of passing both tests (M and E)?
- (b) If the probability of passing Math without any conditions is $P(M) = .44$, what is the probability that a student passes Math or English (M or E)?
5. (9 points) Suppose that the probability of a hurricane in a calendar year is 15%. Find the probability that, in a 11-year period, we have:
- (a) No more than 3 hurricanes.
- (b) Calculate the expected value and 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.
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.