

THIRD TEST OF MATH 23: STATISTICS AND PROBABILITY. SPRING 2013

- (10 points) Find the mean, mode, the first and third quartiles, median, the range and standard deviation for the following set of sample data.
 - 10, 9, 12, 11, 8, 15, 9, 7, 13
- The mean of the scores in a Statistics exam is 87.5 with standard deviation 2.5. Use Tchebychev Theorem to:
 - (5 points) Find an interval that contains at least 75% of the data.
 - (5 points) Find an interval that contains at least 88.9% of the data.
- A manager of a company suspects that the demand of her product is closely related to the disposable income of her larger region. To test the hypothesis she collected the following data of five different targeted regions, where x represents the annual disposable income in millions of dollars and y represents sales volume in thousands of cases of the product

x	10	20	30	40	98
y	2	3	4	5	12

- (5 points) Draw the scattered plot of the set of data. Using only the graph would you estimate the correlation to positive, negative or zero?
 - (5 points) Compute the correlation coefficient r and interpret your result.
 - (5 points) Plot the least square line $y = .11x + .7$, make sure to include the point (\bar{x}, \bar{y}) and the y -intercept.
 - (5 points) What sales volume will be expected for an area with income 80 millions?
- Four cards are randomly selected from a standard 52 card deck **without replacement**. Find the probabilities of the following events:
 - (5 points) All cards are diamonds.
 - (5 points) The first two are diamonds and the next two are hearts.
 - The probability of a defective phone in an office is $p = .35$. If a sample of 11 phones are selected, find the probability that:
 - (5 points) Exactly 4 of them are defective.
 - (5 points) At least 8 of them are defective.
 - What type of distribution follows the number r of defective phones in a sample of 11? [5]
What is the expected value of r ? What is the standard deviation of r ?
 - (10 points) Consider the following probability distribution. Sketch the graph of the distribution and calculate the expected value and standard deviation.

x	1	2	3
P(x)	.4	.35	.25

- Sketch a graph that represents the following probabilities, when z is distributed normal standard and find the actual probabilities

- (a) (5 points) $P(z < 1.65)$
 - (b) (5 points) $P(z > 1.91)$
 - (c) (5 points) $P(-0.21 < z < 2.32)$
8. (10 points) 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) $P(0 < Z < Z_c) = .4830$
9. The average salary of a management position across the country is 35,000. If the distribution is approximately normal with $\sigma = 4,000$, what is the probability that a randomly selected person on a management position makes these salaries?
- (a) (5 points) Less than 30,000 a year
 - (b) (5 points) Between 30,000 and 38,000 a year.