

Math 207
Problem Set II
100 possible points

You may use your own notes, your textbook, the notes on the class conference, a calculator, but you may not discuss this problem set with another person. A signature on the pledged line below indicates that the work turned in for grade represents your work, done in accordance with the above stated conditions.

Remember that working through a problem set should be a learning experience more than a test. It demonstrates whether or not you are able to pull together the topics from Part II of this course. Due class time on Wednesday, March 2, 2011

PLEDGED _____

ATTACH ANY BONUS PROBLEMS:

- a) Gypsy problem: 5 points for 6 stems, 15 points for equation in general.
- b) Card game: 10 points for win on the first three cards, 10 points for win in the rest of the deck. . . add these together and you have the probability of winning.

1. Assume that an IQ test is normally distributed with a mean of 98 and a standard deviation of 14 points. Respond to the following: (4 points each, 24 points)
 - (a) What is the probability that a student selected at random will have an IQ score of below 100?
 - (b) What score should be used on this test if the top five percent were to be classified as gifted?
 - (c) In a sample of 50, how many subjects would you expect to have an IQ score between 70 and 126?
 - (d) What is the probability that the mean of a group of 50 subjects will above 100?
 - (e) What is the probability that a student selected at random will have an IQ score above 100?
 - (f) (i) Is your answer in part (c) consistent with Chebyshev's Theorem? Explain.
(ii) Explain the difference in your answers to (e) and (f).

2. Given: , . (9 points)
 - (a) Find c to make the function a pdf. (5 points)
 - (b) What is the probability that the random variable X will have a probability less than 1? (4 points)

3. Given: , for $x = 2, 3, 4, 5, 6$. Respond to the following: (3 points each, 9 points)
 - (a) Show that f is a discrete pdf.
 - (b) Make a probability histogram.
 - (c) Find the mean and variance.

4. You have a bag with 10 red balls, 12 blue balls, 14 green balls. Let X be the number

of red balls and Y be the number of blue balls. Respond to the following: (4 points each, 16 points)

- (a) Give an expression for $f(x,y)$.
- (b) Find $f(3,3)$ and explain what it means.
- (c) Find $f(2|x=3)$ and explain what it means.
- (d) Pick FOUR, what is the probability that you will have at least one of each color?

5. Misprints on a page occur on the average of one per every 50 pages. What is the probability that a book of 250 pages would have no more than three misprints? (8 points)

6. Given: $0 < x < 2$, $0 < y < 1$. Respond to the following: (9 points)

- (a) Find c to make $f(x,y)$ a jpdf. (5 points)
- (b) Are X and Y independent? Show clearly. (4 points)

7. The mean life of a particular radio that is kept on continually is 1.8 years. If the length of life of this model of radio can best be modeled using the exponential distribution, how long should a guarantee be so that 10% or less would need to be replaced IF they were on continually? (7 points)

8. You have an eight sided fair die with 2 sides red, 3 sides green, and 3 sides blue. Let X be the count of the number of blue sides appearing. Roll the die 12 times. Respond to the following: (18 points)

- (a) Find the probability that you will get exactly 3 blue sides. (3 points)
- (b) Find the probability that you will get at least 4 blue sides. (3 points)
- (c) Find the probability that you will get exactly 5 blue sides. (3 points)
- (d) Estimate the probabilities for (b) and (c) by using the normal approximation. (6 points)
- (e) Was this a good estimation? Why or why not? (3 points)