Math 111: Introduction to Probability
Pop Quiz 4 — November 28, 2007 Name: _____

This quiz covers material from chapter 8.

1. (*5 points*) For each of the following questions, identify it as a:

1. Hypergeometric problem,
2. Binomial distribution problem,
3. Standard normal distribution problem,
4. Normal distribution problem, or an
5. Estimating the binomial distribution by the normal distribution problem.

a. (*1 pt*) _____ Compute $P(-1.2 \leq Z \leq 0.78)$.

b. (*1 pt*) _____ A basketball team has twelve players, of which five are starting players, and seven are bench players. For the team photo, the players line up in three rows of four players each. What is the probability there are no more than two players in the front row?

c. (*1 pt*) _____ Chickenpox is caused by the varicella-zoster virus (VZV), which lays dormant in humans even after the disease has run its course. Even though few people show symptoms again, 85% of the American population has the virus. The University of Maryland has 35,000 students. What is the probability there is a group of 5,000 students who don't have the virus?

d. (*1 pt*) _____ A batter has batting average .286, which basically means they get a hit 28.6% of the time they come to the plate. The batter generally comes to the plate four or five times in a game. What is the probability the batter gets at least one hit in the game if they come to the plate four times? If they come to the plate five times?

e. (*1 pt*) _____ Find X has mean 400 and standard deviation 30. Find $P(371 \leq X \leq 408)$.

continued on other side

2. (*2 points*) A fair coin is flipped ten times, and we want to calculate the probability that heads comes up at least six times. Let X be the number of heads that come up. Which of the following would be the correct way to approach the problem?

a) $P(X \leq 6) = 1 - P(X = 6)$

b) $P(X > 6) = P(X = 6) + P(X = 7)$

c) $P(X > 6) = 1 - P(X \leq 6)$

d) $P(X \geq 6) = 1 - P(X \leq 6)$

e) $P(X \geq 6) = P(X = 6) + P(X = 7) + P(X = 8) + P(X = 10)$

3. (*2 points*) For each of the following binomial distributions, determine the value of n, and determine the values of p and q that **c**orrespond to the probability you are asked to compute. Then determine the value of x that needs to get plugged into the formula $P(X = x) = C(n, x)p^x q^{n-x}$.

a. (*1 pt*) An toy company estimates that 1% of its toys are defective. If it produces ten thousand toys, what is the probability that all of them pass inspection?

$n =$ _____ $p =$ _____ $q =$ _____ $x =$ _____

b. (*1 pt*) A waiter at a local restaurant has a habit of dropping one out of every one hundred plates he carries. In a given week, he has to transport about a thousand dishes. What is the probability every plate remains intact?

$n =$ _____ $p =$ _____ $q =$ _____ $x =$ _____

4. (*2 points*) On the strip of highway between Washington and Baltimore, on average 8% of the cars are going ten miles over the speed limit, and there are fifty thousand cars on the road per day. Thus the number of accidents per week is modeled by a binomial distribution.

a. (*1 pt*) Find n, p, and q.

$n =$ _____ $p =$ _____ $q =$ _____

b. (*1 pt*) If you wanted to calculate the probability that there are between ten and thirty thousand speeders in a week, you would estimate it with a normal distribution. What would the corresponding μ and σ be?

$\mu =$ _____ $\sigma =$ _____