Statistics 1: Sections 2,6,7
Practice Questions for Exam 3
These are sample problems, not a comprehensive listing of all types of problems you could see on the exam. You are responsible for all material covered since the last exam, including homeworks 8, 9 and 10. Calculators and one 8.5" by 11" sheet of handwritten notes allowed. Tables will be included at the end of the exam.

1. The numbers 1,2,3 and 4 are written on four pieces of paper. Suppose two of the pieces of paper are randomly selected from a hat ___without___ replacement.
   a. Give the sample space, S. (Hint: use a tree diagram)
   b. Let X be the sum of the numbers on the two pieces of paper selected. Give the probability distribution of X.

x	p(x)

   c. Calculate the mean and standard deviation of the probability distribution in part (b).

2. Z is the standard normal random variable having mean 0 and standard deviation 1. Find
   a. $P(Z < 0.79)$
   b. $P(Z > -1.94)$
   c. $P(-1.20 < Z < 2.08)$
   d. $P(Z = 1.05)$
   e. Find z* so that $P(Z < z^*) = 0.35$
   f. Find the 70th percentile of the Z distribution.
   g. Find z* so that $P(Z > z^*) = 0.85$

3. Suppose the mean height of women is 64 inches with a standard deviation of 2.6 inches. What percent of women are
   a. Taller than country music singer Taylor Swift, who is 5 feet 11 inches tall.
   b. Between 62 and 67 inches tall
   c. Find the 65th percentile of women's heights.
   d. To be in a club for tall women, a woman's height must be among the top 4% of women's heights. What is the minimum height required to be in the tall women's club.
   e. Use the Empirical Rule to find an interval where 95% of women's heights will fall.

4. In 2001, 21% of the people in the world lived in extreme poverty (less than $1 US dollar per day). If twenty people are randomly selected from the world, what is the probability that
   a. Exactly 4 live in extreme poverty
   b. 2 or more live in extreme poverty

      c.   Between 2 and 4, inclusive, live in extreme poverty

5. (10 points) A balanced die is tossed 600 times.   X = the number of sixes in the 600 tosses.
   a.   What are the mean and standard deviation of X?
   b.   Would it be unusual to observe 150 sixes?
   c.   How many outcomes of this experiment have 2 sixes and 598 non-sixes?

6. (10 points) Recall that probabilities for *continuous* random variables are defined in terms of areas under the probability density function (pdf).   Suppose a random variable X has the pdf y=2x for $0 \le x \le 1$ (as shown below).
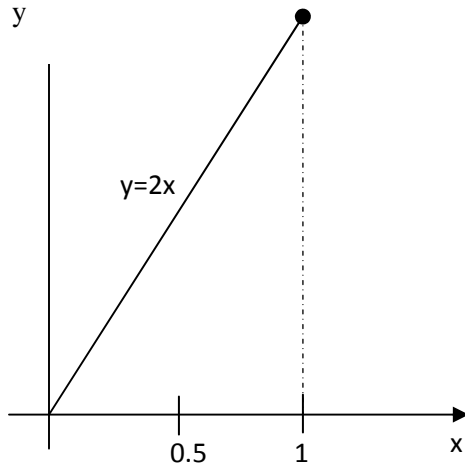
   a.   What is the area under ANY pdf?
   b.   Verify that this pdf has the appropriate area from part(a).
   c.   Calculate P(X < 0.5)
   d.   What is P(X=0.5)?

7. You play $5 to play a game where you roll a pair of fair dice. You win $30 if the sum of the dice is 3 or less.
   a.   Let the random variable X = net amount won on one play of the game. Give the probability distribution of X.
   b.   What is the average amount you win per play of the game?
   c.   Estimate your total "winnings" if you play the game 1000 times, use a negative sign to indicate losses.
   d.   If the casino that is hosting the game wants to make the average winnings per play $0, how much should they charge to play (assuming they still pay $30 if the sum is 3 or less)?