Math 20 Homework # 4

Due April 22, 2013

Do the following problems from the book: 6.1.34(acdef), 6.2.9, 6.2.11, 6.2.15, 6.2.18, 5.1.6, 5.1.8, 5.1.9.

Also, solve the following problems:

1. We have an infinitely large sack that originally (at time 0) contains one red ball and one blue ball, and we have an infinite supply of extra blue and red balls outside of the sack. At each second, we pick one ball at random from the sack, put it back, and add an extra ball of the same color as the one just chosen. (So, after n seconds, the sack contains $n+2$ balls.) What is the distribution for the colors of the balls in the sack after n seconds?

2. Two sacks contain the same total number of balls, some red and some blue. For some integer $n \geq 3$, when we pick n balls with replacement from each sack, the probability of getting all red balls from the first sack is equal to the probability of getting all balls of one color from the second sack. What can you say about n and the distribution of balls in each sack?

3. Suppose X is a random variable with a geometric distribution. Show that for any $n, k \geq 0$,

$$P(X > n + k \mid X > n) = P(X > k).$$