Homework 2 (Due September 26 during class)

Grade Distribution (Total=8+8+8+12=36).

Please simply your answer as much as possible.

1. An urn contains 7 white and 10 black balls. If 5 balls are to be randomly selected consecutively without replacement, what is the probability that the first 2 selected are white and the last 3 black?

2. We roll a fair die repeatedly until we see the number six appear and then we stop.

   (a) What is the probability that we need at most 4 rolls?

   (b) What is the probability that we needed an odd number of die rolls?

3. There are 14 tennis balls in a box, of which 6 have not previously been used. Three of the balls are randomly chosen at a time, played with, and then returned to the box. Later, another 4 balls are randomly chosen from the box. Find the probability that none of these 4 balls has ever been used.

4. An urn contains 1 green ball, 2 red ball, 1 yellow ball and 3 white ball. Each time I draw one ball uniformly at random and then return the ball. Do this for 4 times. What is the probability that there is at least one color that is repeated exactly twice? (Hint: Use inclusion-exclusion with events that determine which color is repeated exactly twice.)