Homework 10: Expectation

1. An urn contains four chips numbered 1 through 4. Two are drawn without replacement. Let the random variable X denote the larger of the two. Find $E(X)$.

2. A fair coin is tossed three times. Let the random variable X denote the total number of heads that appear times the number of heads that appear on the first and third tosses. Find $E[X]$.

3. A box contains 5 red and 5 blue marbles. Two marbles are drawn randomly. If they are the same color, then you win \$1.10; if they are different colors, then you lose \$1.00. Calculate the expected value your winnings.

4. An arrow is fired at random into a circle of radius 8. (Note that the probability that it lands in any region of the circle depends on the *area* of the region.) If its distance from the center is

   0 to 1 inches : win \$10
   1 to 3 inches : win \$5
   3 to 5 inches : win \$2
   5 to 8 inches : lose \$4

   Find the expected winnings.

5. Suppose that two evenly matched teams are playing in the World Series. On average, how many games will be played? (The winner is the first team to get four victories.)

6. Let X have pdf
   $$f_X(x) = 2(1-x), 0 \leq x \leq 1$$
   Find $E(X)$.