HOMEWORK ASSIGNMENT 7

Name: **Due:** Wednesday November 13, 9 am (before recitation).

Note: Homework must be submitted online on Canvas (scanned).

PROBLEM 1:

A pair of dice is thrown. Let X denote the minimum of the two numbers which occur. Find the distribution and expectation of X.

PROBLEM 2:

A fair coin is tossed 4 times. Let Y denote the longest string of heads. Find the distribution and expectation of Y.

PROBLEM 3:

A box contains 10 bulbs of which 3 are defective. A bulb is selected from the box and tested until a nondefective one is chosen. Find the expected number of bulbs to be chosen.

PROBLEM 4:

A lottery with 500 tickets gives 1 prize of \$100, 3 prizes of \$50 each, and 5 prizes of \$25 each.

1. Find the expected winnings of a ticket.

2. If a ticket costs \$1, what is the expected value of the game (that is, the expected profit/loss)?

PROBLEM 5:

A player tosses 2 fair coins. The player wins \$3 if 2 heads occur and \$1 if 1 head occurs. For the game to be fair, how much should the player lose if no heads occur?

PROBLEM 6:

Let X be a random variable with the following distribution:

x	1	3	4	5
f(x)	0.4	0.1	0.2	0.3

Find the mean μ, variance σ^2, and standard deviation σ of X.

PROBLEM 7:

Two cards are selected from a box which contains 5 cards numbered $1, 1, 2, 2$, and 3. Let X denote the sum and Y the maximum of the 2 numbers drawn. Find the distribution, mean, variance and standard deviation of the random variables:

1. X,
2. Y,
3. $Z = X + Y$,
4. $W = XY$.

PROBLEM 8:

Let X be a continuous random variable with the following distribution:

$$f(x) = \begin{cases} 1/8 & 0 \le x \le 8, \\ 0 & \text{elsewhere.} \end{cases}$$

Find:

1. $P(2 \le X \le 5)$,
2. $P(3 \le X \le 7)$,
3. $P(X \ge 6)$.

PROBLEM 9:

A card is drawn and replaced 3 times from an ordinary 52-card deck. Find the probability that:

1. 3 hearts were drawn,
2. at least 1 heart was drawn.

PROBLEM 10:

Suppose 2 percent of the bolts produced by a factory are defective. In a shipment of 3600 bolts from the factory, find the expected value of defective bolts and the standar deviation.

PROBLEM 11:

A fair dice is tossed 180 times. Find the expected number of times the face 6 occurs and the standard deviation.

PROBLEM 12:

Suppose the life expectancy X (in hours) of a transistor tube is exponential, that is, the density function of X and its cumulative distribution are

$$f(x) = \frac{1}{180}e^{-x/180}, \qquad F(x) = 1 - e^{-x/180}.$$

Find the probability that the tube will last:

1. less than 36 h,
2. between 36 h and 90 h,
3. more than 90 h.