STAT/MA 41600
More Practice Problems: September 24, 2014

1. Winnings and Losing. Suppose that a person wins a game of chance with probability 0.40, and loses otherwise. If he wins, he earns 5 dollars, and if he loses, then he loses 4 dollars. Assume that he plays ten games independently. Let X denote the number of games that he wins. [Hint: His gain or loss is $5X + (-4)(10 - X) = 9X - 40$, since he loses $10 - X$ games.]

(a.) What is his expected gain or loss (altogether) during the ten games?

(b.) What is the variance of his gain or loss (altogether) during the ten games?

(c.) What is the probability that he wins \$32 or more during the ten games?

2. Telemarketers. One out of every eight calls to your house is a telemarketer. Assume that the likelihood of telemarketers is independent from call to call. Let X denote the number of telemarketers during the next three calls.

(a.) What is the mass of X?

(b.) Draw a picture of the mass of X.

(c.) Draw a picture of the CDF of X.

3. Dating. You randomly call 20 of your friends who could be potential partners for a dance. You think that they all respond to your requests independently of each other, and you estimate that each one is 7% likely to accept your request.

(a.) Find the probability that at least 3 people would accept the invitation.

(b.) Find the expected number of people who would accept the invitation.

(c.) Find the variance of the number of people who would accept the invitation.

4. Dining Hall. Let X, Y, Z be (respectively) the number of nights that Alice, Bob, and Charlotte eat in the dining hall during a 7-day week. Assume that X, Y, Z are independent Binomial random variables that each have $n = 7$ and $p = .65$.

(a.) What is the distribution of $X + Y + Z$, i.e., the total number of meals eaten by these three people (altogether) during a week?

(b.) Find $\text{Var}(X + Y + Z)$.

5. Hearts. You draw seven cards, *without replacement*, from a shuffled, standard deck of 52 playing cards. Let X be the number of hearts that are selected.

(a.) What is the expected number of hearts? Why?

(b.) Is X a binomial random variable? Why or why not?