STAT/MA 41600
Practice Problems: October 1, 2014

1. Hungry customers. At a certain hot dog stand, during the working day, the number of people who arrive to eat is Poisson, with an average of 1 person every 2 minutes.

a. What is the probability that exactly 3 people arrive during the next 10 minutes?

b. What is the probability that nobody arrives during the next 10 minutes?

c. What is the probability that at least 3 people arrive during the next 10 minutes?

2. Errors in Dr. Ward's book. Dr. Ward has carefully edited his book, but as all careful readers know, all books have some errors. In the first 250 pages, only 10 errors have been found altogether! (Hooray!) So it is reasonable to guess that the number of errors *per page* is Poisson, with an average of $10/250 = 0.04$ errors per page.

Suppose that the same low rate of errors continues in the second half of the book when it arrives, i.e., a Poisson number of errors, with an average of $10/250 = 0.04$ per page.

a. How many errors are expected in the next 100 pages of Dr. Ward's book?

b. What is the probability of exactly 5 errors in the next 100 pages of Dr. Ward's book?

3. Telemarketers. Suppose that, on average, 3 telemarketers call your house during a 7-day period.

a. What is the mass of the number of telemarketers calling your house during 1 day?

b. What is the probability that no telemarketers call your house on 1 given day?

c. What is the probability that exactly 2 telemarketers call your house on 1 given day?

4. Superfans. The number of Yankees fans shopping at a sports store, per hour, is Poisson with mean 8 per hour. The number of Red Sox fans shopping at the same store is Poisson with mean 6 per hour. Assume that the numbers of fans of the two types are independent. In particular, there is no person who is simultaneously a fan of both teams.

a. In a three hour period, how many Yankees and Red Sox fans do we expect altogether?

b. Find the probability that exactly 1 person enters the store during the next 20 minutes who likes the Yankees or Red Sox.

5. Shoppers. Suppose that the number of men who visit a website is Poisson, with mean 12 per minute, and the number of women who visit the same site is also Poisson, with mean 15 per minute. Assume that the number of men and women are independent.

a. During the next 10 seconds, what is the probability that 1 man and 2 women visit the site?

b. What is the variance of the total number of people who visit the site in the next 5 minutes?