Extra questions for Poisson Process

1. Customers arrive at a bank according to a Poisson process with rate 10 per hour. Give that two customers arrive in the first 5 minutes, what ist hte probability that (a) both arrived in the first two minutes and (b) at least one arrived in the first two minutes.

2. Traffic at a certain intersection follows a Poisson process with rate 2/3 vehicles per minute. Ten percent of the vehicles are trucks; the other ninety percent are cars.

    (a) What is the probability at least one truck passes in an hour?

    (b) Given that 10 trucks have passed by in an hour, what is the expected number of vehicles that have passed by?

    (c) Given that 50 vehicles have passed by in an hour, what is the probability there were exactly 5 trucks and 45 cars?

3. Concert tickets are sold at a ticket counter. Females and males arrive at times of independent Poisson processes with rates 30 and 20.

    (a) What is the probability the first three customers are female?

    (b) If exactly 2 customers arrived in the first five minutes, what is the probability both arrived in the first three minutes.

    (c) Suppose that regardless of sex, a customer will buy one ticket with probability 3/5 and two tickets with probability 2/5. What are the mean and variance of the number of tickets sold in the first hour?

    (d) Using the probabilities from the previous question, what are the mean and variance of the number of tickets sold to females?

4. Suppose that the number of calls per hour to an answering service follows a Poisson process with rate 4.

    (a) What is the probability that fewer than 2 calls came in the first hour?

(b) Suppose that 6 calls arrive in the first hour, what is the probability there will be fewer than 2 in the second hour.

(c) Given that 6 calls arrive in the first two hours, what is the conditional probability exactly 2 arrived in the first hour and exactly 4 in the second?

(d) Suppose that the operator gets to take a break after she has answered 10 calls. How long are here work periods on average? Express the probability that she needs to work longer than 2 hours before getting a break as an integral over a specific density.

5. Hockey teams 1 and 2 score goals at times of Poisson process with rates 1 and 2. Suppose that $N_1(0) = 3$ and $N_2(0) = 1$. (a) What is the probability that $N_1(t)$ will reach 5 before $N_2(t)$ does? (b) Now, suppose that the Poisson processes have rates λ_1 and λ_2.

6. Edwin catches trout at times of a Poisson process with rate 3 per hour. Suppose that the trout weigh an average of 4 pounds with a standard eviation of 2 pounds. Find the mean and standard deviation of the total weight of fish he catches in two hours.