

## Stat 416, Practice Problems

1. Customers arrive at a shipping office at times of a Poisson process with rate 3 per hour. The office was supposed to open at 8 AM but the clerk Oscar overslept and came in at 10 AM.
  - (a) What is the probability that no customer came in the two hours before Oscar arrived?
  - (b) If one customer did arrive between 8 and 10, what is the expected value of his wait for Oscar?
  - (c) If no customer arrived before 10, what is the distribution of the time that Oscar must wait for the arrival of the first customer?
  - (d) What is the variance of the time until the fifth customer arrives after 10 AM?
2. Traffic on a particular road follows a Poisson process with rate 6 cars per minute. A deer runs out of the woods, and it takes the deer 5 seconds to cross the road.
  - (a) What is the probability the deer will get hit?
  - (b) If the deer can cross in two seconds, what is the probability the deer will get hit?
  - (c) If a car passes some time in the 10 seconds after the deer starts across the road and it takes the deer 5 seconds to get across, what is the probability that the deer will be hit?
3. 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 two calls came in the first hour?
  - (b) Suppose that six calls arrive in the first two hours, what is the probability exactly two arrived in the first hour and four in the second hour.

- (c) Suppose that the operator gets to take a break after she has answered ten calls. How long are her average work periods?

Now, suppose that  $3/4$  of the calls are made by men and  $1/4$  by women.

- (d) Given that 3 men call in one hour, what is the probability that 2 women call in that hour?
- (e) What is the probability that in one hour exactly 2 men and 3 women will call the answering service?
- (f) What is the average time before 3 women call?
4. Edwin catches fish at time that correspond to a Poisson process with rate 3 per hour. Suppose 40% of the fish are salmon and 60% are trout. The trout weigh an average of 4 pounds with a standard deviation of 2 pounds. Find the mean and standard deviation of the total weight of trout he catches in two hours.