Math 325 Modeling
Poisson and Queuing Processes Assignment
Due Wednesday, April 16.

1. 6.9.12 from Mooney and Swift, p. 352. (There are typos in my edition of the book - this one should have been #2. It starts off "Show by induction that the system…")

2. 6.9.15 from Mooney and Swift, p. 352 (should have been #5, showing that the Poisson and the binomial really are related).

3. Cars arrive at a tollbooth 24 hours per day according to a Poisson process with a mean rate of 15 per hour.

(a) What is the expected number of cars that will arrive at the booth between 1:00 pm and 1:30 pm?

(b) What is the expected length of time between two consecutively arriving cars?

(c) It is now 1:12 pm and a car has just arrived. What is the expected number of cars hat will arrive between now and 1:30 pm?

(d) It is now 1:12 pm and a car has just arrived. What is the probability that exactly two more cars will arrive between now and 1:30 pm?

(e) It is now 1:12 pm and the last car to arrive came at 1:05 pm. What is the probability that no additional cars will arrive before 1:30 pm?

(f) It is now 1:12 pm and the last car to arrive came at 1:05 pm. What is the expected length of time between the last car to arrive and the next car to arrive?

4. A large hotel has placed a single fax machine in an office for customer services. The arrival of customers needing to use the fax follows a Poisson process with a mean rate of eight per hour. The time each person spends using the fax is highly variable and is approximated by an exponential distribution with a mean time of five minutes.

(a) What is the probability that the fax office will be empty?

(b) What is the probability that nobody will be waiting to use the fax?

(c) What is the average time that a customer must wait in line to use the fax?

(d) What is the probability that an arriving customer will see two people waiting in line?