Operations Research II
University of California, Berkeley
Spring 2006
Midterm 1

1. The number if storms in the upcoming rainy season is Poisson distributed but with a parameter value Λ that is uniformly distributed over $(0, 5)$. i.e. Λ is uniformly distributed over $(0, 5)$, and given that $\Lambda = \lambda$, the number of storms is Poisson with mean λ. Find the probability that there are at least 3 storms this season.

2. Incidents of drug usage occur in the bathroom of Harry's restaurant. The times of these incidents constitute a Poisson process of rate two per hour. Harry is concerned about this because of the possible effect on business and because he worries about how effective the government's war on drugs will be. Consequently, Harry visits the bathroom at time points which constitute a Poisson process of rate one per hour. Assume this Poisson process is independent of the Poisson process of drug incidents. Assume also that if a drug incident has occurred, Harry detects it.

   (a) On his first visit, what is the probability that Harry finds evidence of drug use; i.e. what is the probability that a drug incident occurs before Harry checks the bathroom for the first time?

   (b) What is the expected time until Harry detects evidence of drug use?

3. Customers arrive at a store at rate $\lambda = 10$ per hour. Given that there were 8 arrivals in a certain one hour period, what is the probability that none of these people arrived in either the first or last 10 minutes?

4. A warehouse has 30 gallons of gas. Customers arrive and purchase amounts which are exponentially distributed with mean 15 gallons. What is the probability that the requests of the first 3 customers will be met in full?