MATH 155H Fall 2003 Assignment #2

1. Four hundred leaflets are dropped at random over 50 square blocks.
   (a) Find the probability that your block gets at least 3.
   (b) Find the Poisson approximation to the answer in (a).

2. On the average, you get 3 telephone calls per day. Find the probability that in 5 years there will be at least one day without a call.

3. A message is sent across a chanel to a receiver. The probability that the message is *xxxxx* is .6. The probability that the message is *yyyyy* is .4. For each letter transmitted, the probability of error (that an x will become an y, or vice versa) is .1. Find the probability that the message was *xxxxx* if 2 x's and 3 y's are received.

4. You have n keys on your key ring. One of them unlocks the front door, but you forgot which one, so you keep trying keys until the door unlocks. Find the expected number of trials needed if
   (a) you sensibly try the keys *without* replacement
   (b) you foolishly try the keys *with* replacement.

5. Assume drivers are independent.
   (a) If 5% of drivers fail to stop at the stop sign, find the probability that at least 2 of the next 100 drivers fail to stop.
   (b) If on the average 3 drivers fail to stop at the stop sign during each hour, find the probability that at least 2 fail to stop during the tonight's rush hour.

6. Prove that: if $X \sim Geometric(p)$ then $\mathrm{Var}[X] = \frac{1-p}{p^2}$.