1. An oil prospector will drill a succession of holes in an effort to find a productive well. The probability of success on any given trial is 0.2 and the trials are independent.

   (a) What is the probability that the third hole drilled is the first to yield a productive well?

   (b) If the prospector can afford to drill at most ten wells, what is the probability that he fails to find a productive well?

2. Two people took turns tossing a fair die until one of them tossed a 6. Person A tossed first. Given that person B threw the first 6, what is the probability that B obtained the first 6 on her second toss (the fourth toss overall)?

3. The probability that you get a busy signal when calling a certain office is 0.6. Calls are independent.

   (a) What is the mean number of calls up to and including the first call that gets through?

   (b) You and your friend are both calling the office. What is the probability that it takes exactly four tries in total before both of you get through?

4. There are 30 restaurants in a certain town. Assume that four of them have health code violations. A health inspector chooses 10 restaurants at random to inspect.

   (a) What is the probability that two of the restaurants with violations will be visited?

   (b) What is the probability that fewer than two of the restaurants with violations will be visited?

5. A company buys a policy to insure its revenue in the event of major snowstorms that shut down business. The policy pays nothing for the first such snowstorm of the year and $10,000 for each one thereafter, until the end of the year. The number of major snowstorms per year that shut down business is assumed to have a Poisson distribution with mean 1.5. Calculate the expected amount paid to the company under this policy during a one-year period.

6. Cars arrive at a toll booth according to a Poisson process with mean 80 cars per hour. What is the probability that at least one car arrives in a one-minute period?

7. A parking lot has two entrances. Cars arrive at entrance I according to a Poisson process with mean three per hour and at entrance II according to a Poisson process with mean four per hour. The numbers of cars arriving at the two entrances are independent. What is the probability that a total of three cars will arrive at the parking lot in a given hour?