1. We are given a circle $C$ of radius $r$ and we wish to determine the probability $p$ that the length of a “randomly selected” chord $AB$ is greater than the length $\sqrt{3} r$ of the inscribed equilateral triangle.

2. A malicious computer is storing $n$ packets of which $m$ packets are malicious. A remote computer fetches the packets one at a time and the packets are accessed randomly. Find the probability of encountering a malicious packet by the $k_{th}$ transmission.

3. In a local area network there are four malicious computers which transmit at random malicious messages to a commercial bank. The first one sends on average 2000 messages a day of which 5% are malicious. The second one sends on average 500 messages a day of which 40% are malicious. The third and fourth computers send 1000 messages each with 10% malicious messages. Suppose the bank receives a malicious message. Determine the probability that the malicious message came from the second computer.

4. A biased coin is tossed till a head appears for the first time. What is the probability that the number of required tosses is odd?

5. Box 1 contains 1000 bulbs of which 10% are defective. Box 2 contains 2000 bulbs of which 5% are defective. Two bulbs are picked from a randomly selected box:
   a. Find the probability that both bulbs are defective
   b. Assuming that both are defective, find the probability that they came from the same box

6. In the New York state lottery, six numbers are drawn from the sequence of numbers 1 through 51. What is the probability that the six numbers drawn will have
   a. All one digit number
   b. Two one digit and four two digit numbers?