1. What is the probability that a five-card poker hand contains exactly one ace?

2. What is the probability that a five-card poker hand contains a flush, that is, five cards of the same suit?

3. What is the probability of these events when we randomly select a permutation of the 26 lowercase letters of the English alphabet?
   (a) The first 13 letters of the permutation are in alphabetical order.
   (b) a is the first letter of the permutation and z is the last letter.
   (c) a and z are next to each other in the permutation.
   (d) a and b are not next to each other in the permutation.
   (e) a and z are separated by at least 23 letters in the permutation.
   (f) z precedes both a and b in the permutation.

4. Show that if $E$ and $F$ are independent events, then $\overline{E}$ and $\overline{F}$ are also independent events.

5. Find the smallest number of people you need to choose at random so that the probability that at least one of them has a birthday today exceeds $1/2$. 