

Supplementary Problems in Counting and Probability

1. A particular legislative body consists of 30 Democrats and 20 Republicans. A five member committee is to be selected from its membership. How many different 5 member committees are possible given that the committee must have
 - (a) Any five members, without regard to party affiliation.
 - (b) Exactly 3 Democrats and 2 Republicans.
 - (c) At least 2 Democrats.
 - (d) At least 2 Democrats and at least 1 Republican.
2. A TV station program director must choose his prime time week night lineup. He has 15 hours to fill and 25 one hour shows to choose from. How many different prime time schedules are possible? (Note: Selecting the same 15 shows in different time slots is considered a different schedule.)
3. The passwords for a particular computer network consist of seven alphanumeric characters (letters or numbers.) The system is *case sensitive*, meaning Capital letters and lower case letters are considered different (“A” \neq “a”). The first character must be an upper case letter. The last character must be a number. How many different passwords are possible?
4. If a single die is rolled 6 times, what is the probability of getting a six at least once?
5. In a 5/49 lottery, 5 numbers are drawn between 1 and 49. Find the probability for a single play of getting
 - (a) 1st prize: all 5 numbers.
 - (b) 2nd prize: 4 out of 5 numbers.
 - (c) 3rd prize: 3 out of 5 numbers.
6. If 30 people in a room shake hands, how many handshakes will occur?
7. If 5 cards are dealt from a deck of 52 playing cards, find the probability of getting

- (a) 4 of a kind. (4 of the same rank.)
 - (b) Two pairs. (2 of one rank and 2 of another rank.)
 - (c) Three of a kind. (But not better!)
8. A true false quiz consists of ten questions. What is the probability of getting a 70% or better (at least 7 correct) by random guessing?
9. I have a class consisting of 17 females and 13 males. Assuming that there is no gender bias in mathematical ability or motivation, find probabilities for the gender distribution of the top five students.

| Female | Male | Probability |
|--------|------|-------------|
| 5 | 0 | |
| 4 | 1 | |
| 3 | 2 | |
| 2 | 3 | |
| 1 | 4 | |
| 0 | 5 | |

What is the probability that at least 3 females are among the top 5?