

## Practice problems: Chapter 1

1. How many ways can you give 10 cookies to 4 friends if each friend gets at least 1 cookie?
2. How many ways are there to sprinkle 10 oreo pieces on our 3 scoops of ice cream? Assume that each scoop is a different flavor of ice cream. (i.e., Each scoop is distinguishable.)
3. How many ways are there to sprinkle 10 sprinkles on 3 scoops, such that the first scoop gets at least 5 pieces?
4. Assume that each scoop can only hold a maximum of 8 pieces. How many ways are there to sprinkle 10 sprinkles on 3 scoops?
5. Assume that each scoop can only hold a maximum of 8 pieces and a minimum of 2. How many ways are there to sprinkle 14 sprinkles on our 3 scoops of ice cream?
6. Expand  $(a + b)^5$ .
7. Expand  $(a + b + c)^4$ .
8. In how many ways can 8 people be seated in a row if
  - (a). there are no restrictions on the seating arrangement?
  - (b). persons A and B must sit next to each other?
  - (c). there are 4 men and 4 women and no 2 men or 2 women can sit next to each other?
  - (d). there are 5 men and they must sit next to each other?
  - (e). there are 4 married couples and each couple must sit together?
9. A person has 8 friends, of whom 5 will be invited to a party.
  - (a). How many choices are there if 2 of the friends are feuding and will not attend together?
  - (b). How many choices if 2 of the friends will only attend together?
10. The game of bridge is played by 4 players, each of whom is dealt 13 cards. How many bridge deals are possible?

**Solutions:**

1.  $\binom{9}{3}$

2.  $\binom{12}{2}$

3.  $\binom{7}{2}$

4.  $\binom{12}{2} - \binom{3}{1}\binom{2}{1} - \binom{3}{1}$

5.  $\binom{10}{2} - \binom{3}{1}\binom{2}{1} - \binom{3}{1}$

6.  $a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$

7.  $(a^4 + b^4 + c^4) + 4(a^3b + ab^3 + b^3c + bc^3 + c^3a + ca^3) + 6(a^2b^2 + b^2c^2 + c^2a^2) + 12(a^2bc + b^2ca + c^2ab)$

8. (a). 40320; (b). 10080; (c). 1152; (d). 2880; (e). 384

9. (a). 36; (b). 26

10.  $\frac{52!}{(13!)^4}$