

1. In how many ways can five of seven books be arranged on a shelf?
2. In how many ways can officers – President, Vice-President, Secretary, and Treasurer – be elected for a club having twenty-five members?
3. Suppose you have three (3) sweaters, four (4) pairs of pants/slacks, five (5) shirts, six (6) pairs of socks, and two (2) belts.
  - (a) How many outfits consisting of a sweater, a pair of pants/slacks, a shirt, a pair of socks, and a belt can be made?
  - (b) How many outfits consisting of a pair of pants/slacks, a shirt, a pair of socks, and a belt can be made?
  - (c) How many outfits consisting of a pair of pants/slacks, a shirt, a pair of socks, and a belt can be made if you may or may not wear a sweater?
  - (d) How many outfits consisting of a pair of pants/slacks, a shirt, and a belt can be made if you may or may not wear a sweater and if you may or may not wear socks?
4. Suppose you have nine (9) shirts, six (6) pairs of pants, five (5) cardigans, three (3) jackets, seven (7) pairs of socks, four (4) pairs of shoes, three (3) belts, and two (2) hats. If you purchased your clothes so that they can be worn together without color or pattern clashes, how many outfits consisting of a shirt, pair of pants, socks, shoes, and either a cardigan or jacket can you make if you may or may not wear a belt and if you may or may not wear a hat?
5. At *Le Chateau Armand Restaurant*, the special three-course dinner consists of an appetizer of soup or salad, entrée with which you select a potato dish and a vegetable dish, and dessert as well as a beverage. If there are three soups, four salads, eight entrees, five potato dishes, four vegetable dishes, nine desserts, and six beverages, how many three-course dinners can be made if you may have French bread, onion rolls, corn bread, or cinnamon rolls with your appetizer?
6. Suppose two kinds of characters are used to make license plate numbers, the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 and the letters of the English alphabet.
  - (a) How many six-place license plate numbers can be created?
  - (b) How many six-place license plate numbers can be created if the letters O and I cannot be used?
  - (c) How many six-place license plate numbers can be created if only the first two (2) characters of the license plate number must be letters which cannot be repeated followed by digits which can be repeated?
  - (d) How many six-place license plate numbers can be created if the license plate number consists of three (3) letters followed by three (3) digits?
  - (e) How many six-place license plate numbers can be created if the license plate number consists of alternating pairs of letters and digits, starting with letters?
  - (f) How many six-place license plate numbers can be created if the license plate number consists of alternating pairs of letters and digits, starting with letters, if the characters cannot be repeated?
7. Discuss the differences and similarities between the questions. (Questions to be asked during class.)
8. In how many ways can you select five (5) of eleven (11) shirts to take with you for your trip to Aruba during Spring Break?
9. In how many ways can you wear five (5) of eleven (11) shirts during your trip to Aruba during Spring Break?

10. Discuss the differences and similarities between the questions.
- (a) In how many ways can you purchase twelve (12) of the twenty-five new songs that you like on iTunes?
  - (b) How many playlists could you make using twelve (12) of the twenty-five new songs that you like on iTunes?
  - (c) How many CDs could you make using twelve (12) of the twenty-five songs that you buy on iTunes?
11. A bag contains three (3) red marbles, four (4) green marbles, five (5) blue marbles, six (6) yellow marbles, and two (2) purple marbles.
- (a) In how many ways can eight (8) marbles be taken from the bag?
  - (b) In how many ways can two (2) red marbles, two (2) green marbles, two (2) blue marbles, and two (2) yellow marbles be taken from the bag?
  - (c) In how many ways can one (1) marble of each color be taken from the bag?
  - (d) In how many ways can three (3) blue marbles, two (2) yellow marbles, and one (1) green marble be taken from the bag?
  - (e) In how many ways can five (5) marbles be drawn from the bag?
  - (f) In how many ways can seven (7) marbles be drawn from the bag?
12. In how many ways can three (3) books be arranged on a shelf?
13. In how many ways can three (3) out of four (4) books be arranged on a shelf?
14. In how many ways can three (3) out of four (4) books be selected?
15. In how many ways can you purchase twelve (12) of the twenty-five new songs that you like on iTunes?
16. How many playlists could you make using twelve (12) of the twenty-five new songs that you like on iTunes?
17. How many CDs could you make using twelve (12) of the twenty-five songs that you buy on iTunes?
18. You attend a book fair and purchase nineteen (19) new books. In how many ways can you put ten (10) of your new books on your bookshelf?
19. You attend a book fair and purchase nineteen (19) new books. In how many ways can you bring ten (10) of your new books to class to show to your classmates?
20. In how many ways can you select five (5) of eleven (11) shirts to take with you for your trip to Aruba during Spring Break?
21. In how many ways can you wear five (5) of eleven (11) shirts during your trip to Aruba during Spring Break?
22. How many five-card hands can be dealt from a fair poker deck?
23. How many groups of five students can be made for a class of thirty students if (a) positions within the group are not assigned? (b) positions within the group are assigned?