Stat 50 – Worksheet #3: Counting Techniques

Use counting techniques: Tree diagrams, the Fundamental Principle of Counting, combinations, and permutations to answer the following questions.

1. A coin is tossed and a die is rolled. How many outcomes are in the sample space, S?

2. A coin is tossed, a die is rolled, and a marble is randomly selected from a box with 1 red, 1 blue and 1 green marble. How many outcomes in S?

3. Dave has 4 pairs of pants, 6 shirts, and 3 ties. How many outfits consisting of pants, a shirt and a tie are possible?

4. How many ways can I create a ranked list of my favorite pets from the following list: horse, dog, cat? (Hint: There are not very many outcomes, try listing them out, then think about a counting technique that would also work.)

5. How many ways can I create a ranked list of my favorite pets from the following list: horse, dog, cat, snake, pot-belly pig?

6. If 5 people compete in a running race.

   (a) How many different ways can a gold, silver and bronze medal be awarded?

   (b) What if there are 10 people in the race and gold, silver and bronze medals?

7. How many ways can the letters in the word 'tables' be arranged?

8. Persons A,B,C,and D are contestants in a chess tournament.

   (a) How many chess games need to be played if each contestant plays every other contestant once?

   (b) How many ways can a gold and silver medal be awarded to the contestants?

   (c) How are parts (a) and (b) mathematically related?

9. A class has 30 students. How many ways can

   (a) A committee of three students be formed?

   (b) A president, vice president, and treasurer be chosen?

10. There are 3 novels and 4 math books. How many ways can they be put on a shelf if

    (a) the books can be arranged in any order?

    (b) the math books must be together and the novels must be together?

11. Five separate awards (best leadership qualities, most athletic, etc) are to be presented to students from a class of 30. How many different outcomes are possible if:

    (a) a student can receive any number of awards

    (b) each student can receive at most 1 award

12. A 7-place license plate consists of 5 letters followed by 2 numbers. How many such license plates are possible? How many such plates have no repeated letters and no repeated numbers?