Probability: Tree Diagrams, Organized lists, the Fundamental Counting Principle

1. A hat can be white or red and can come in four different sizes: small, medium, large, and extra large.
   1. Find all possible hats that you could buy by drawing a tree diagram. Remember to ask yourself what is the first thing you are going to choose, color or size? Then the next choice branches off the first choice. Refer to the class notes for a visual.
   2. How many hats can be made?
2. The surf shop also sells single scoop ice cream. There are 4 flavors: vanilla, strawberry, chocolate, and mint and two kinds of cones: regular or sugar.
   1. Find all possible types of ice creams by writing an organized list.
   2. How many ice cream possibilities are there?
3. At a bagel shop you can choose from five different types of bagels, four different spreads, and four different toppings. Use the Fundamental Counting Principle to find out how many different bagel combinations are possible.
4. A particular state’s license plates are issued with 2 letters, followed by 2 numbers and a letter. Use the Fundamental Counting Principle to find out how many different license plates are possible.
5. What is the mathematical definition of probability?
6. Using the information you have already found in problems 1-4, find the probability of the following:
   1. If all outcomes are equally likely and you randomly choose a hat, what is the probability that you will get a red hat? (Use the information from problem 1.)
   2. If all outcomes are equally likely and you randomly choose an ice cream, what is the probability that you will get vanilla? (Use the information from problem 2.)
   3. If all outcomes are equally likely and you randomly choose a bagel, what is the probability that you will get any of the possible outcomes? (Use the information from problem 3.)
   4. If all outcomes are equally likely and you randomly choose a license plate, what is the probability that you will get AA11A? (Use the information from problem 3.)