MAT 223, Discussion Questions 10.16

1. For each of the problems below, determine which counting rule you are going to use (multiplication rule, permutations, combinations), and then find the probability in each scenario.

   a. Consider a state license plate with six characters total, with three capital letters (not including O), followed by three numbers (i.e. ABC 123). What is the probability of a random plate having only vowels and even numbers?

   fundamental counting rule

   $$\frac{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}{25 \cdot 25 \cdot 25 \cdot 10 \cdot 10 \cdot 10} = \frac{5^6}{25^3 \, 10^3} = .001$$

   b. There are 435 members of Congress. Suppose that on a particular day, ten members are allowed to speak in support of a particular bill. What is the probability that a random member of Congress will be chosen to speak?

   Counting not needed

   $$\frac{10}{435}$$

   c. There are four prizes of differing values in a raffle drawing with 100 tickets sold. What is the probability that you will win one of the prizes?

   Counting not needed

   $$\frac{4}{100}$$

   d. A math club has 15 members (9 men and 6 women) and they want to form a three-member committee to plan an event. What is the probability that the committee will consist of all women?

   Combinations

   $$\frac{6C3}{15C3} = .043956\ldots \qquad 4.4\%$$

   e. A coin is flipped 12 times. What is the probability that the coin comes up heads 5 times?

   Combinations & fundamental counting rule

   $$\frac{12C5}{2^{12}} = .1933\ldots \qquad 19.3\%$$

   f. If I choose a 5-card poker hand from a standard deck of cards, what is the probability it will contain only spades?

   Combinations

   $$\frac{13C5}{52C5} = 4.95198\ldots \times 10^{-4}$$

2. Give an example of your own of a probability problem that uses 1) combinations, 2) permutations, 3) multiplication rule.

   answers will vary
   1) *poker hands (chance of having a pair), committees, door prizes.*
   2) *standing in line, baseball line-ups, marbles*
   3) *marbles, coin flips, passwords*

3. Comment on the article here: http://ww2.kqed.org/mindshift/2015/08/04/seeing-struggling-math-learners-as-sense-makers-not-mistake-makers/.