1. You go to Coldstone Creamery to get a dish of ice cream. There are 8 flavors available, plus you want to get some candy mixed in – there are 15 types to choose from.
   (a) How many potential desserts could you make by choosing one flavor of ice cream and one type of candy?
   (b) How many choices would you have if you also have to choose between small, medium or large?

2. Your password for a new banking account is supposed to have 3 lowercase letters followed by a four-digit PIN.
   (a) Write out the calculations needed to determine the total possible number of passwords of this type.
   (b) What would be the calculation if the bank only required that there are 7 characters? (numbers or letters only – no special characters)

3. You are arranging your 11 textbooks for this semester on a shelf above your desk.
   (a) Write an expression you would evaluate to determine in how many possible orders you could place these books.
   (b) Suppose that 6 of these books are for your English Lit. class, and you want to place all those together at the left end of the shelf. How many orders are there for all 11 with this restriction in place? (just write the expression – don't evaluate)

4. There are 30 people in this class. The first 2 people who arrive on Monday will be awarded the titles of class president (first person) and vice-president (second person).
   (a) In how many ways could these titles possibly be bestowed?
   (b) What if the two are both given the same title - "co-president"...in how many ways could this be done?

5. A track meet has 15 entrants in the 1600m race. The first 5 finishers win points for their teams and are awarded ribbons for their placing.
   (a) Write an expression for the number of ways in which the ribbons could be distributed.
   (b) After the race, these top 5 finishers are photographed for the local paper. Write an expression for the number of possible groups of 5 that could appear in the photo.

6. You're at a sandwich shop getting lunch. You can get one of 2 sizes of sandwiches. They offer 12 kinds of vegetables/toppings, 5 kinds of dressings/sauce and 6 kinds of meats.
   (a) If you select 1 meat, 1 sauce and 1 veggie (unlikely!) along with choosing a size, how many sandwiches could you possibly get?
   (b) If you choose 1 meat, 1 sauce, 4 veggies along with selecting the size, how many sandwiches could you possibly get?

MAT 142 – Counting Practice

Class examples:
Motivation = whataburger commercials
        ---> recall number of possible subsets – here's the other way to count!
   1. Counting Principle (tree diagrams!)
        (a) car options (paint, wheels, interior, stereo)
        (b) area codes – old style (NOT 0 or 1, 0 or 1, any)
        (c) license plates (repeat or not)

   2. Permutations
        (a) boarding a small plane (1st class, then others)
        (b) boarding a larger plane – need for factorial notation
        (c) standing in a line
        (d) assigning 1st - 3rd place at the art show, 1st - 10th places – factorial shortcut

   3. Combinations
        (a) 5 people – how many groups of 2?
        (b) 52 cards – how many hands of 5?
        (c) class with fr, soph, jr, sr. 4-person committees of different sorts