Math 300: Homework Set #3.

1. How many different ways are there to choose a dozen donuts from the 21 varieties at a donut shop?

2. A bagel shop has onion bagels, poppy seed bagels, egg bagels, salty bagels, pumpernickel bagels, sesame seed bagels, raisin bagels, and plain bagels. How many ways are there to choose
   (a) one dozen bagels?
   (b) one dozen bagels with at least one of each kind?

3. A croissant shop has plain, cherry, chocolate, almond, apple, and broccoli croissants. How many ways are there to choose
   (a) three dozen croissants?
   (b) two dozen croissants with at least two of each kind?
   (c) two dozen croissants with no more than two broccoli croissants?
   (d) two dozen croissants with at least five chocolate croissants and at least three almond croissants?
   (e) two dozen croissants with at least one plain croissant, at least two cherry croissants, at least three chocolate croissants, at least one almond croissant, at least two apple croissants, and no more than three broccoli croissants?

4. How many strings of 20-decimal digits are there that contain two 0s, four 1s, three 2s, one 3, two 4s, three 5s, two 7s, and three 9s?

5. Suppose that a large family has 14 children, including two sets of identical triplets, three sets of identical twins, and two individual children. How many ways are there to seat these children in a row of chairs if the identical triplets or twins cannot be distinguished from one another?

6. How many different strings can be made from the letters in ABRACADABRA, using all of the letters?

7. How many different strings can be made from the letters in AARDVARK, using all of the letters, if all three As must be consecutive?

8. A student has three mangos, two papayas, and two kiwi fruits. If the student eats one piece of fruit each day, and only the type of fruit matters, in how many different ways can these fruits be consumed?

9. Find the coefficient of $x^3y^2z^5$ in $(x + y + z)^{10}$.

10. How many terms are there in the expansion of $(x + y + z)^{100}$?

11. Find the number of non-negative integer solutions to $x_1 + x_2 + x_3 \leq 6$. (Hint: Introduce another variable to convert the inequality into an equality.)