Introduction to Counting Principles

1. A local restaurant is offering a breakfast special. For $2.99, you can choose a breakfast consisting of a juice (apple or orange), a main course (eggs, French toast, pancakes or waffles) and a hot beverage (coffee, tea, or hot chocolate). How many different breakfasts can be ordered?

2. An individual can be classified as male or female with red, brown, black, or blond hair and with brown, blue or green eyes. How many different classifications are possible? Construct a tree diagram to show all possible classifications.

3. Some car doors can now be unlocked by pressing the correct sequence of buttons. A display of 5 buttons on the car door handle is shown below.

   0-1  2-3  4-5  6-7  8-9

   The correct sequence of five buttons must be pressed in order to unlock the door. If the same button may be used more than once, how many different “sequences” are possible?
4. In California, standard automobile license plate numbers currently consist of a single digit (a number 1 through 9) followed by three letters of the alphabet followed by three digits. How many different license plate numbers does this provide?

5. How many 3-letter code words are possible using the first 10 letters of the alphabet if
   a) no letter can be repeated?

   b) letters can be repeated?

   c) adjacent letters cannot be the same?

6. A child forms three-letter "words" using letters from the word NUMBER. A letter may be repeated within a "word".
   a) How many three-letter "words" are possible?

   b) How many three-letter "words" beginning with the letter M are possible?

   c) How many three-letter "words" beginning with a vowel are possible?

   d) How many three-letter "words" with a vowel for the middle letter are possible?

   e) How many three-letter "words" containing exactly one vowel are possible?