1. **No Equal Digits** How many 7-digit numbers have no two adjacent digits equal?

2. **Strings** What is the number of strings you can construct given:

    (a) n ones, and m zeroes.

    (b) n_1 A's, n_2 B's and n_3 C's.

    (c) $n_1, n_2, \ldots, n_k$ respectively of k different letters.

3. **Palindromes** How many 5-digit palindromes are there? (A palindrome is a number that reads the same way forwards and backwards. For example, 27872 and 48484 are palindromes, but 28389 and 12541 are not.)

4. **Fruits** Suppose you want to buy n fruits, and you can buy 0 or more of any type. In how how many ways can you do that if:

    (a) There are apples and oranges at the market.

    (b) There are apples, oranges, and bananas at the market.

    (c) There are k kinds of fruits at the market.

5. **Combinatorial Proof III** Prove $\binom{2n}{n} = 2\binom{2n-1}{n-1}$