Exercise 1. A survey is conducted among 50 students, asking which of three sports they like: football, basketball, and tennis. The results are as follows:
30 like football,
25 like basketball,
20 like tennis,
15 like both football and basketball,
10 like both basketball and tennis,
12 like both football and tennis,
5 like all three sports.
How many students do not like any of these three sports?

Exercise 2. Compute the number even 4-digit positive integers with no repeated digits.

Exercise 3. A committee of 5 people is to be formed from a group of 8 women and 6 men. How many such committees can be formed if:

(a) There are no restriction.

(b) The committee must include exactly 3 women.

(c) The committee must include at least 3 women and 1 man.

Exercise 4. Prove the following identities.

(a) If $k \leq m \leq n$ are positive integers, then

$$\binom{n}{m}\binom{m}{k} = \binom{n}{k}\binom{n-k}{m-k}$$

(b) For any positive integer n

$$\binom{2n}{2} + \binom{2n}{n+1} = \frac{1}{2}\binom{2n+2}{n+1}$$