【Discrete Math】Day2

【Ch2】Let us count(3)

2.4 Sequences

Now, we want to determine *the number of strings of length n* composed of some other set of symbols, for example, a, b, and c.

We can observe that for the first element of the string, we can choose any of a, b, and c, that is, we have 3 choices. No matter what we choose, there are 3 choices for the second of the string, so the number of ways to choose the first two elements is $3^2 = 9$. Going on in a similar manner, we get that the number of ways to choose the whole string is 3^n

Thus, we can obtain the following theorem:

Theorem 2.2 *The number of strings of length n composed of k given elements is k^n.*

The following problem leades to a generalization of this question.

Suppose that a database has 4 fields:

1. The first, containing an 8-character abbreviation of an employee's name
2. The second, M or F for sex
3. The third, the birthday of the employee, in the format mm-dd-yy
4. The fourth, a jobcode which can be one of 13 possibilities.

How many different records are there?

The answer is

$$26^8 \times 2 \times 36524 \times 13 = 1983071923709194 24$$

This leads to the following theorem:

Theorem 2.3 *Suppose that we want to form strings of length n so that we can use any of a given set of k_1 symbols as the first element of the string, any of a given set of k_2 symbols as the second element of the string, etc., any of a given set of k_n symbols as the last element of the string. Then the total number of strings we can form is $k_1 \cdot k_2 \cdot \ldots \cdot k_n$.*