

**2021/2022 SOUTHERN CALIFORNIA REGIONAL  
INTERNATIONAL COLLEGIATE PROGRAMMING CONTEST**

**Problem ?  
Secret Sauce**

Restaurant Secret is a popular restaurant in town. Its key to success is its secret sauce - in almost every dish, the secret sauce turns an ordinary dish into a best-seller.

Despite its name, the secret sauce is just a combination of some ingredients (plus their amount, which is always integer). For example,

$$\text{SecretSauce} = \text{garlic} \times 2 + \text{sugar} \times 2 + \text{salt} \times 4 + \text{water} \times 3$$

Today, the secret sauce runs out. Fortunately, the restaurant has some ingredients (not necessarily all) and some other sauces in stock, each with unlimited supply, which can be used to compose secret sauce. For simplicity, the amount of each ingredient / sauce must be integer. The recipes of all sauces are known and given as a combination of ingredients / sauces (plus their amount, which is always integer). For example,

$$\text{GarlicSauce} = \text{garlic} \times 1 + \text{salt} \times 2$$

$$\text{SweetSauce} = \text{sugar} \times 2 + \text{water} \times 3$$

$$\text{SweetGarlicSauce} = \text{SweetSauce} \times 1 + \text{GarlicSauce} \times 1$$

Suppose that all 3 sauces (Garlic sauce, Sweet sauce and Sweet Garlic sauce) are in stock, 1 unit of Secret sauce can be made from: (a) 2 units of Garlic sauce and 1 unit of Sweet sauce, or (b) 1 unit of Sweet Garlic sauce and 1 unit of Garlic sauce.

The manager of Restaurant Secret hired you to compute in how many ways 1 unit of Secret sauce can be made.

*Input*

The input format is:

$M$   
 $I_1$   
 $I_2$   
...  
 $I_M$   
 $N$   
 $S_1 K_1 C_{1,1} U_{1,1} C_{1,2} U_{1,2} \dots C_{1,K_1} U_{1,K_1}$   
 $S_2 K_2 C_{2,1} U_{2,1} C_{2,2} U_{2,2} \dots C_{2,K_2} U_{2,K_2}$   
...  
 $S_N K_N C_{N,1} U_{N,1} C_{N,2} U_{N,2} \dots C_{N,K_N} U_{N,K_N}$   
 $L$   
 $C_1$   
 $C_2$   
...  
 $C_L$   
 $K_T C_{T,1} U_{T,1} C_{T,2} U_{T,2} \dots C_{T,K_T} U_{T,K_T}$

The first line consists of an integer  $M$  ( $1 \leq M \leq 8$ ), the number of all ingredients.

The following  $M$  lines contain the names of ingredients, one per line. Each name is an alphabetical string starting with a lowercase letter, and the length is no more than 20 characters. All ingredient names are unique.

The following line consists of an integer  $N$  ( $1 \leq N \leq 100$ ), the number of all known sauces.

The following  $N$  lines describe the recipes of sauces. The  $i$ -th line starts with the name of the  $i$ -th sauce  $S_i$  (an alphabetical string starting with an uppercase letter, and the length is no more than 20 characters). The rest of the line describes the recipe to make 1 unit of this sauce: an integer  $K_i$  ( $1 \leq K_i \leq M$ ), the number of different sauces/ingredients, followed by  $K_i$  pairs of strings and integers ( $C_{i,j}$  and  $U_{i,j}$ ), where  $C_{i,j}$  is the name of a sauce or ingredient, and  $U_{i,j}$  is the number of units ( $1 \leq U_{i,j} \leq 4$ ). All sauce names are unique. All  $C_{i,j}$  must be unique within this recipe and must be one of  $I_1, I_2, \dots, I_M, S_1, S_2, \dots, S_N$ . There are no cyclic references in the recipes. No sauce will ever aggregate more than 65536 units of any ingredient

The following line consists of an integer  $L$  ( $1 \leq L \leq M + N$ ), the number of different sauces/ingredients in stock.

The following  $L$  lines contain  $C_1, C_2, \dots, C_L$ , the names of sauces/ingredients in stock, one per line. All  $C_i$  must be one of  $I_1, I_2, \dots, I_M, S_1, S_2, \dots, S_N$ . Each sauce/ingredient in stock has unlimited supply.

The following line describes how to make 1 unit of the secret sauce: an integer  $K_T$  ( $1 \leq K_T \leq M$ ), the number of different ingredients, followed by  $K_T$  pairs of strings and integers ( $C_{T,i}$  and  $U_{T,i}$ ), where  $C_{T,i}$  is the name of an ingredient, and  $U_{T,i}$  is the number of units ( $1 \leq U_{T,i} \leq 4$ ). All  $C_{T,i}$  must be one of  $I_1, I_2, \dots, I_M$ .

### *Output*

An integer, which is the number of ways to make 1 unit of the secret sauce. The number is guaranteed to be less than  $2^{63}$ .

### *Sample Input*

```
2
sugar
garlic
2
SauceA 1 sugar 1
SauceB 2 garlic 1 SauceA 1
3
garlic
SauceA
SauceB
2 garlic 2 sugar 3
```

### *Output for the Sample Input*

3

### *Explanation for the Sample*

There are three ways to make 1 unit of the secret sauce: (1) 2 units of garlic and 3 units of SauceA; (2) 1 unit of garlic, 2 units of SauceA and 1 unit of SauceB; (3) 1 unit of SauceA and 2 units of SauceB.