Problem G – Problem G

Chimpa is a powerful wizard apprentice. He has been learning about magic spells lately. There are m magic tuples in the world. The i-th magic tuple is defined as (c_i, d_i, p_i), where c_i and d_i are lowercase letters and p_i is a positive integer. A magic spell of size n is a string that meets the following conditions:

- For all $i \in [1, n]$, s_i is one of the first 20 lowercase letters in the English alphabet.

- For all $i \in [1, n-1]$, there exists a magic tuple (s_i, s_{i+1}, p) such that $i = pk + 1$ for some non-negative integer k.

Recall that we denote the i-th character in s as s_i.

Chimpa learned that the effect of a magic spell is unique determined by its first letter, last letter and length. There are q effects that he wants to trigger. For the j-th effect, he wonders how many magic spells begin with the letter x_j, end with the letter y_j and have length n_j. Help him to find the answer modulo 998244353.

Input

The first line contains two characters m and q ($1 \le m \le 1000$ and $1 \le q \le 100$) − the number of magic tuples and the number of effects that Chimpa wants to trigger.

The following m lines contain the description of the magic tuples. The $(1 + i)$-th line contains two letters c_i and d_i followed by an integer p_i ($c_i, d_i \in [a - t]$ and $1 \le p_i \le 10$).

The following q lines contain the description of the effects. The $(1 + m + j)$-th line contains two letters x_j and y_j followed by an integer n_j ($x_j, y_j \in [a - t]$ and $1 \le n_j \le 10^{18}$).

Output

For each effect, print a line containing the number of magic spells modulo 998244353.

Sample input 1	Sample output 1
4 4	1
a a 1	1
a b 1	256
b a 1	256
b b 1	
a a 1	
a a 2	
a a 10	
b a 10	

Sample input 2	Sample output 2
10 4	0
e m 6	0
t t 5	1
a b 2	0
b k 3	
h a 2	
b a 6	
a a 1	
s l 10	
d e 1	
o g 3	
c s 3	
a b 3	
t t 1	
e n 3	