Problem M

Magic Spells

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 ($1 \leq m \leq 1000$ and $1 \leq q \leq 100$) − 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 $1 \leq p_i \leq 10$).

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 $1 \leq n_j \leq 10^{18}$).

Output

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

Input example 1	**Output example 1**
4 4 a a 1 a b 1 b a 1 b b 1 a a 1 a a 2 a a 10 b a 10	1 1 256 256

Input example 2	**Output example 2**
10 4 e m 6 t t 5 a b 2 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	0 0 1 0