E. A Museum Robbery

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

There's a famous museum in the city where Kleofáš lives. In the museum, n exhibits (numbered 1 through n) had been displayed for a long time; the i-th of those exhibits has value v_i and mass w_i.

Then, the museum was bought by a large financial group and started to vary the exhibits. At about the same time, Kleofáš... gained interest in the museum, so to say.

You should process q events of three types:

- type 1 — the museum displays an exhibit with value v and mass w; the exhibit displayed in the i-th event of this type is numbered $n+i$ (see sample explanation for more details)
- type 2 — the museum removes the exhibit with number x and stores it safely in its vault
- type 3 — Kleofáš visits the museum and wonders (for no important reason at all, of course): if there was a robbery and exhibits with total mass at most m were stolen, what would their maximum possible total value be?

For each event of type 3, let $s(m)$ be the maximum possible total value of stolen exhibits with total mass $\leq m$.

Formally, let D be the set of numbers of all exhibits that are currently displayed (so initially D = {1, ..., n}). Let $P(D)$ be the set of all subsets of D and let

Then, $s(m)$ is defined as

Compute $s(m)$ for each . Note that the output follows a special format.

Input

The first line of the input contains two space-separated integers n and k $(1 \leq n \leq 5000,\ 1 \leq k \leq 1000)$ — the initial number of exhibits in the museum and the maximum interesting mass of stolen exhibits.

Then, n lines follow. The i-th of them contains two space-separated positive integers v_i and w_i $(1 \leq v_i \leq 1\,000\,000,$ $1 \leq w_i \leq 1000)$ — the value and mass of the i-th exhibit.

The next line contains a single integer q $(1 \leq q \leq 30\,000)$ — the number of events.

Each of the next q lines contains the description of one event in the following format:

- $1\ v\ w$ — an event of type 1, a new exhibit with value v and mass w has been added $(1 \leq v \leq 1\,000\,000,$ $1 \leq w \leq 1000)$
- $2\ x$ — an event of type 2, the exhibit with number x has been removed; it's guaranteed that the removed exhibit had been displayed at that time
- 3 — an event of type 3, Kleofáš visits the museum and asks his question

There will be at most $10\,000$ events of type 1 and at least one event of type 3.

Output

As the number of values $s(m)$ can get large, output the answers to events of type 3 in a special format.

For each event of type 3, consider the values $s(m)$ computed for the question that Kleofáš asked in this event; print one line containing a single number

where $p = 10^7 + 19$ and $q = 10^9 + 7$.

Print the answers to events of type 3 in the order in which they appear in the input.

Examples

input

```
3 10
30 4
60 6
5 1
9
3
1 42 5
1 20 3
3
2 2
2 4
3
1 40 6
3
```

output

```
556674384
168191145
947033915
181541912
```

input

```
3 1000
100 42
100 47
400 15
4
2 2
2 1
2 3
3
```

output

```
0
```

Note

In the first sample, the numbers of displayed exhibits and values $s(1), \ldots, s(10)$ for individual events of type 3 are, in order:

The values of individual exhibits are $v_1 = 30$, $v_2 = 60$, $v_3 = 5$, $v_4 = 42$, $v_5 = 20$, $v_6 = 40$ and their masses are $w_1 = 4$, $w_2 = 6$, $w_3 = 1$, $w_4 = 5$, $w_5 = 3$, $w_6 = 6$.

In the second sample, the only question is asked after removing all exhibits, so $s(m) = 0$ for any m.