

Problem G

Longest Chain

Input: Standard Input
Time Limit: 60 seconds

Let us compare two triples $a = (x_a, y_a, z_a)$ and $b = (x_b, y_b, z_b)$ by a partial order \prec defined as follows.

$$a \prec b \iff x_a < x_b \text{ and } y_a < y_b \text{ and } z_a < z_b$$

Your mission is to find, in the given set of triples, the longest ascending series $a_1 \prec a_2 \prec \dots \prec a_k$.

Input

The input is a sequence of datasets, each specifying a set of triples formatted as follows.

```
m  n  A  B
x1 y1 z1
x2 y2 z2
⋮
xm ym zm
```

Here, m , n , A and B in the first line, and all of x_i, y_i and z_i ($i = 1, \dots, m$) in the following lines are non-negative integers.

Each dataset specifies a set of $m + n$ triples. The triples p_1 through p_m are explicitly specified in the dataset, the i -th triple p_i being (x_i, y_i, z_i) . The remaining n triples are specified by parameters A and B given to the following generator routine.

```
int a = A, b = B, C = ~(1<<31), M = (1<<16)-1;
int r() {
    a = 36969 * (a & M) + (a >> 16);
    b = 18000 * (b & M) + (b >> 16);
    return (C & ((a << 16) + b)) % 1000000;
}
```

Repeated $3n$ calls of $r()$ defined as above yield values of $x_{m+1}, y_{m+1}, z_{m+1}, x_{m+2}, y_{m+2}, z_{m+2}, \dots, x_{m+n}, y_{m+n},$ and z_{m+n} , in this order.

You can assume that $1 \leq m + n \leq 3 \times 10^5$, $1 \leq A, B \leq 2^{16}$, and $0 \leq x_k, y_k, z_k < 10^6$ for $1 \leq k \leq m + n$.

The input ends with a line containing four zeros. The total of $m + n$ for all the datasets does not exceed 2×10^6 .

Output

For each dataset, output the length of the longest ascending series of triples in the specified set.
If $p_{i_1} < p_{i_2} < \dots < p_{i_k}$ is the longest, the answer should be k .

Sample Input

```
6 0 1 1
0 0 0
0 2 2
1 1 1
2 0 2
2 2 0
2 2 2
5 0 1 1
0 0 0
1 1 1
2 2 2
3 3 3
4 4 4
10 0 1 1
3 0 0
2 1 0
2 0 1
1 2 0
1 1 1
1 0 2
0 3 0
0 2 1
0 1 2
0 0 3
0 10 1 1
0 0 0 0
```

Output for the Sample Input

```
3
5
1
3
```