

Problem B. Descendants of the dragon

Time limit 1000 ms
Memory limit 256MB

Problem Description

In the mysterious world of Teyvat, where the Seven Nations stand together, countless ancient secrets are buried. Long ago, scholars from the wisdom-filled nation of Sumeru discovered a powerful formula known as the Recursive Array. It is said that this formula unveils the flow of elemental energy, controlling the very essence of time and space. Legend has it that solving the formula will summon the descendants of the dragon.

However, this formula has been lost for centuries—until now. You and your companions discover fragments of this knowledge in ancient murals. These murals describe a recursive sequence that determines the intensity of elemental energy at different points in time. To unlock the full potential of this power, you must determine the value of the sequence at a given point in time and calculate the total accumulation of elemental energy from the beginning to that moment.

The above is what Traveler and Paimon read on the mural. After finishing the cryptic description, Paimon looked puzzled and asked, 'Traveler, is this for real? Where are the dragon's descendants?' The Traveler pulls out a notebook and starts calculating, 'Probably not, but the guide says we get 50 Primogems if we finish this puzzle, so let's just solve it quickly.'

The sequence is defined as follows:

$$x_n = a \cdot x_{n-1} + b \cdot x_{n-2} + c$$

Where x_n represents the elemental power at the n -th moment. Given the values of x_1 , x_2 , the coefficients a , b , and c , and the moment n , your task is to calculate the elemental energy x_n at that moment and the total accumulation of energy S_n , where S_n is defined as

$$S_n = x_1 + x_2 + \cdots + x_n$$

There will be k lines, each line contains different x_1 , x_2 , a , b , c , and n . For each line, you should compute and output x_n and $S_n \cdot s$ (this means if $s = 0$, you don't need to compute S_n).

Since the energies involved are immensely powerful, both x_n and S_n must be calculated modulo $10^9 + 7$.

Input format

First line contains two integers k and s ($1 \leq k \leq 1000$, $s = 0$ or 1).

Then each k line contains six integers x_1 , x_2 , a , b , c , and n ($1 \leq x_1, x_2, a, b, c \leq 10^9$, $3 \leq n \leq 10^{18}$).

Output format

For each line, output two integers: the value of x_n and the total accumulated energy $S_n \cdot s$, both modulo $10^9 + 7$.

Subtask score

Subtask	Score	Additional Constraints
1	20	$n \leq 3000$
2	20	$s = b = c = 0$
3	40	$s = 0$ (means no need to compute S_n)
4	20	No constraints

Sample

Sample Input 1

```
4 1
1 1 1 1 0 3
1 1 1 1 0 4
1 1 1 1 0 5
1 1 1 1 0 6
```

Sample Output 1

```
2 4
3 7
5 12
8 20
```

Sample Input 2

```
2 0
1 1 2 3 1 3
1 1 1 1 2 4
```

Sample Output 2

```
6 0
7 0
```

Sample Input 3

```
3 0
1 1 4 0 0 10
1 2 2 0 0 5
1 5 1 0 0 36
```

Sample Output 3

```
65536 0
16 0
5 0
```