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FiberNazi Numbers

Problem code: BYCO17H

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You are given m ranges, $[a_i, b_i]$. From each range you need to pick a number k_i such that the minimum distance I between any two such k_i and k_j is maximum. Once you determine I , you need to maximize $G(x)$ for a given x which is defined as:

$$G(x) = k_{j_1}G(x-1) + k_{j_2}G(x-2) + k_{j_3}G(x-3) + \dots + k_{j_m}G(x-m)$$

The $k_{j_1}, k_{j_2} \dots$ in the above expression are chosen by you, subject to the constraint that the minimum distance between any two of them is I (determined by you earlier). They needn't be in the same order as the given ranges. Note that $G(1), G(2), \dots, G(m)$ are all given to be 1.

Input

- The first line of the input contains an integer T denoting the number of test cases. The description of T test cases follows.
- The first line of each test case contains a single integer m denoting the number of ranges. The second line contains m space-separated integers a_1, a_2, \dots, a_m denoting the start of each of the range. The third line contains m space-separated integers b_1, b_2, \dots, b_m denoting the end of each of the range.
- The fourth line contains x .

Output

- For each test case, output a single line containing 2 space separated integers I and the maximum value of $G(x) \bmod 10^9+7$.

Constraints

- $1 \leq T \leq 10$
- $1 \leq m \leq 10$
- $0 \leq a_i \leq b_i \leq 10^6$
- $1 \leq x \leq 10^6$

Example

Input:

```
2
2
1 1
1 1
20
2
0 0
2 2
10
```

Output:

```
0 6765
2 256
```

Explanation

Example case 1. Here $m=2$, so our $G(x)$ is a second order recursive function. The ranges of the parameters given are $[1,1]$ and $[1,1]$, so we don't have much of a choice, and both parameters have to be 1. Therefore $G(x) = 1.G(x-1) + 1.G(x-2)$. Since $x=20$, we have $G(20)$ is the 20th Fibonacci number (starting the numbers from 1,1,2,... instead of 0,1,1,2,...)

Example case 2. Here $m=2$ again, so our $G(x)$ is again a second order recursive function. The ranges of the parameters given are $[0,2]$ and $[0,2]$, so we can only have our parameters as 0 and 2. Therefore $G(x)$ can be $G(x) = 0.G(x-1) + 2.G(x-2)$ or $G(x) = 2.G(x-1) + 0.G(x-2)$. But since we want to maximize $G(x)$, we'll choose the latter. Since $x=10$, we have $G(10)=256$.

Author: rvns03

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Source Limit: 50000 Bytes

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