

# Problem BORINGCONVERSATION: Boring Conversation Anyway...

Heavily armed, our friends Han, Luke, and Chewbacca have just broken into the prison of the Imperial Space Station in order to rescue the allied Princess Leia. While Luke is searching for the princess' cell, Han holds the line at the prison's entrance. Unfortunately, an imperial officer far away became suspicious after noticing the noise of the shots in the prison and directly made a phone call to the entrance, where Han is waiting. Taking the call, Han is in trouble: what to say in order to provide Luke with as much time as possible?



Figure 1: Han on the phone

Luckily, the officer's questions to Han are predictable, because they strictly follow the Imperial Communication Protocol Convention (ICPC). This protocol regulates the questions to ask and how to react to answers: the convention specifies a set of possible answers and for each a subsequent question.

Unfortunately, for some questions the convention does not offer any predefined choice, e.g. for personal questions like in Fig. ???. In these cases, Han has no other choice than aborting the conversation, resulting in the officer raising the alarm.

**Officer:** What happened?  
**Han:** Slight weapons malfunction, but we're fine.  
**Officer:** We're sending a squad up.  
**Han:** Negative. We had a reactor leak here now. Give us a few minutes . . .  
**Officer:** Who is this? What's your operating number?  
**Han:**



Figure 2: An example conversation ending with a personal question.

If the officer is already satisfied and not suspicious any more, he starts asking so-called safe questions. Hence, after those questions Han can safely end the conversation and hang up. But he can also continue the conversation if he likes to. Given the ICPC, is it possible for Han to keep the conversation going on forever; and if not, how many safely ending conversations are there?

## Input

The input starts with a line containing two integers  $Q$  and  $S$  ( $1 \leq Q \leq 10\,000$ ,  $0 \leq S \leq Q$ ).  $Q$  denotes the number of questions and  $S$  the number of safe questions. The second line contains  $S$  distinct integers  $h$ , with  $0 \leq h < Q$ , listing the questions on which Han can safely end the conversation if he likes to.

Then  $Q$  lines follow. Each of them begins with an integer  $0 \leq n \leq 10\,000$ , denoting the number of answers that are offered by the ICPC, followed by  $n$  integers  $q_1, \dots, q_n$ , with  $0 \leq q_i < Q$ . If Han picks the  $i$ th answer, then the officer will ask the question  $q_i$  next. The officer will start the conversation by asking question 0.

You may safely assume that the sum of all the  $n$ s will not exceed 1 000 000.

## Output

Print *infinite*, if Han is able to keep the conversation going forever. Otherwise, print the number of safely ending conversations modulo  $1\,000\,000\,007 = (10^9 + 7)$ . Two conversations are considered the same if they consist of the same questions and answers in the same order.

**Sample Input 1**

```
5 2
3 4
2 1 2
2 4 4
2 3 4
0
0
```

**Sample Output 1**

```
4
```

**Sample Input 2**

```
5 2
2 4
2 1 3
2 2 3
1 1
1 4
0
```

**Sample Output 2**

```
infinite
```

**Sample Input 3**

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

**Sample Output 3**

```
infinite
```