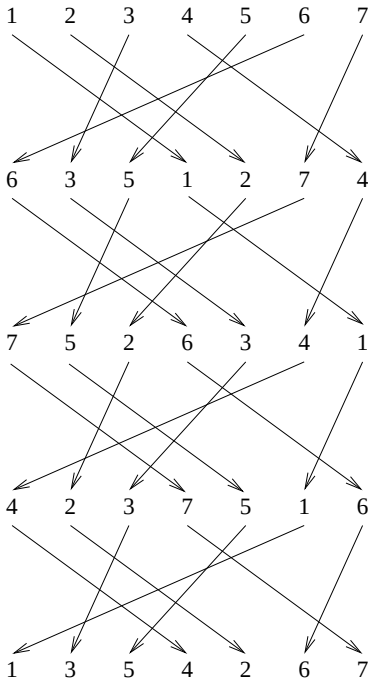
Permutations P90339_en

Olimpiada Informática Española — Final 2007 (2007)



A permutation of the set $\{1, 2, \ldots, n\}$ is a way to sort those numbers. For instance, [123], [132], [213], [231], [312], and [321] are the 6 possible permutations for $n = 3$.

An alternative way to describe a permutation is giving its cycles. For instance, the permutation [6351274] can be written (1 6 7 4) (2 3 5). This is, to the position 1 goes the 6, to the position 6 goes the 7, to the position 7 goes the 4, to the position 4 goes the 1 (first cycle), to the position 2 goes the 3, to the position 3 goes the 5, and to the position 5 goes the 2 (second cycle). Notice that there are various ways to describe a permutation using cycles. For instance, the last permutation can be written also as (3 5 2) (6 7 4 1).

As can be seen on the right, the same permutation can be applied repeatedly. Thus, applying twice [6351274] [7526341] = (7 1) (6 4) (5 3 2) is obtained.

After three times we have [4237516] = (4 7 6 1) (2) (3) (5), and after 4 times [1364267] = (1) (4) (6) (7) (3 5 2). It is easy to see than after 12 times [1234567] = (1) (2) (3) (4) (5) (6) (7) would be obtained.

Your task is to write a program that, for each given permutation, prints the result to apply it a certain number of times.

Input

The input consists of a sequence of cases. Each case starts with a line with n, c, and m (respectively, the number of elements of the permutation, its number of cycles, and the number of tests). c lines follow, one per cycle. Each cycle follows exactly the format of the instances. Then, m lines come, each one with k (the number of times that the permutation must be applied). You can assume $1 \leq n \leq 10000$, $1 \leq c \leq n$, $m \geq 1$, and $k \geq 1$.

Output

For each case of the input, your program must print the permutation obtained after applying k times the given permutation. It must print a line in white in the end of the answers for each case. Follow the format of the instances.

Score

- **(25 points)**
- **(20 points)** Some test cases will exclusively contain cases like the ones in the instance of input 2, in which all the $k \leq 100$.
- **(55 points)** Other test cases will contain cases of every kind, in which $k \leq 10^9$.

Sample input 1

```
7 2 3
(1 6 7 4)
(2 3 5)
1
1
1

4 4 1
(1)
(4)
(2)
(3)
1
```

Sample output 1

```
6 3 5 1 2 7 4
6 3 5 1 2 7 4
6 3 5 1 2 7 4

1 2 3 4
```

Sample input 2

```
7 2 8
(1 6 7 4)
(2 3 5)
1
2
3
4
12
16
20
24

4 1 3
(2 3 4 1)
1
2
100
```

Sample output 2

```
6 3 5 1 2 7 4
7 5 2 6 3 4 1
4 2 3 7 5 1 6
1 3 5 4 2 6 7
1 2 3 4 5 6 7
1 3 5 4 2 6 7
1 5 2 4 3 6 7
1 2 3 4 5 6 7

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

Sample input 3

```
7 2 1
(3 5 2)
(6 7 4 1)
1000000000
```

Sample output 3

```
1 3 5 4 2 6 7
```

Scoring

- **TestA:** **25 Points**

  Some test cases will exclusively contain cases like the ones in the instances of input 1, in which all the k are 1.

- **TestB:** **20 Points**

  Some test cases will exclusively contain cases like the ones in the instance of input 2, in which all the $k \leq 100$.

- **TestC:** **55 Points**

  Other test cases will contain cases of every kind, in which $k \leq 10^9$.

Sample input 1

```
7 2 3
(1 6 7 4)
(2 3 5)
1
1
1

4 4 1
(1)
(4)
(2)
(3)
1
```

Sample output 1

```
6 3 5 1 2 7 4
6 3 5 1 2 7 4
6 3 5 1 2 7 4

1 2 3 4
```

Sample input 2

```
7 2 8
(1 6 7 4)
(2 3 5)
1
2
3
4
12
16
20
24

4 1 3
(2 3 4 1)
1
2
100
```

Sample output 2

```
6 3 5 1 2 7 4
7 5 2 6 3 4 1
4 2 3 7 5 1 6
1 3 5 4 2 6 7
1 2 3 4 5 6 7
1 3 5 4 2 6 7
1 5 2 4 3 6 7
1 2 3 4 5 6 7

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

Sample input 3

```
7 2 1
(3 5 2)
(6 7 4 1)
1000000000
```

Sample output 3

```
1 3 5 4 2 6 7
```

Problem information

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