

Contest Duration: 2025-06-21(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250621T2100&p1=248>) - 2025-06-21(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250621T2240&p1=248>) (local time) (100 minutes)

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## F - Contraction

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Time Limit: 4 sec / Memory Limit: 1024 MiB

Score : 525 points

### Problem Statement

You are given an undirected graph  $G_0$  with  $N$  vertices and  $M$  edges. The vertices and edges of  $G_0$  are numbered as vertices  $1, 2, \dots, N$  and edges  $1, 2, \dots, M$ , respectively, and edge  $i$  ( $1 \leq i \leq M$ ) connects vertices  $U_i$  and  $V_i$ .

Takahashi has a graph  $G$  and  $N$  pieces numbered as pieces  $1, 2, \dots, N$ .

Initially,  $G = G_0$ , and piece  $i$  ( $1 \leq i \leq N$ ) is placed on vertex  $i$  of  $G$ .

He will now perform  $Q$  operations in order. The  $i$ -th operation ( $1 \leq i \leq Q$ ) gives an integer  $X_i$  between 1 and  $M$ , inclusive, and performs the following operation:

In  $G$ , if pieces  $U_{X_i}$  and  $V_{X_i}$  are placed on different vertices and there exists an edge  $e$  (on  $G$ ) between them, create a graph  $G'$  by contracting that edge. In this case, if self-loops are created, remove them, and if multi-edges exist, replace them with simple edges.

Then, all pieces that were placed on the two vertices connected by edge  $e$  in  $G$  are placed on the newly generated vertex by the contraction of  $e$  in  $G'$ . Pieces that were placed on other vertices in  $G$  are placed on the corresponding vertices in  $G'$ . Finally, set this resulting  $G'$  as the new  $G$ .

If pieces  $U_{X_i}$  and  $V_{X_i}$  are placed on the same vertex, or if the vertices they are on are not connected by an edge, do nothing.

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For each of the operations  $i = 1, 2, \dots, Q$ , output the number of edges in  $G$  after the  $i$ -th operation.

► Edge Contraction

## Constraints

- $2 \leq N \leq 3 \times 10^5$
- $1 \leq M \leq 3 \times 10^5$
- $1 \leq U_i < V_i \leq N$
- $(U_i, V_i) \neq (U_j, V_j)$  if  $i \neq j$ .
- $1 \leq Q \leq 3 \times 10^5$
- $1 \leq X_i \leq M$
- All input values are integers.

## Input

The input is given from Standard Input in the following format:

```
N M
U1 V1
U2 V2
⋮
UM VM
Q
X1 X2 ... XQ
```

## Output

Output  $Q$  lines. On the  $i$ -th line ( $1 \leq i \leq Q$ ), output the number of edges in  $G$  after the  $i$ -th operation.

## Sample Input 1

Copy

Copy

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

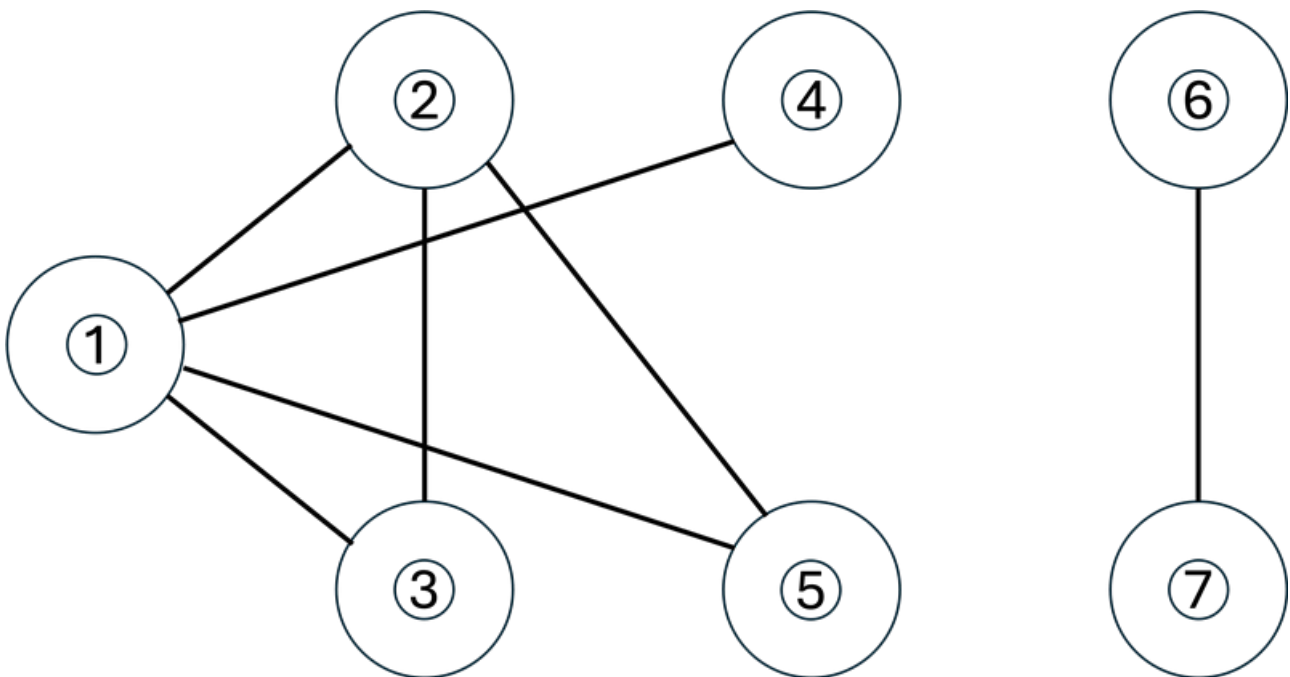
## Sample Output 1

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```
4
3
3
3
2
```

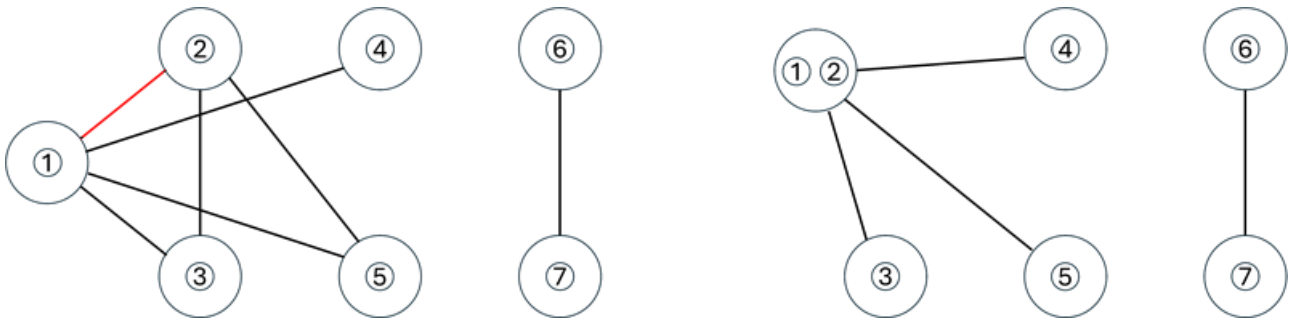
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Initially,  $G$  is as shown in the figure below. The circled numbers represent pieces with those numbers.



In the 1st operation, we contract the edge between the vertices where pieces 1 and 2 are placed (left figure below).

After the operation,  $G$  becomes as shown in the right figure below, and in particular, the number of edges is 4. Note that self-loops have been removed and multi-edges have been replaced with simple edges.



In the 2nd operation, we contract the edge between the vertices where pieces 1 and 3 are placed.

After the operation,  $G$  becomes as shown in the left figure below, and the number of edges becomes 3.

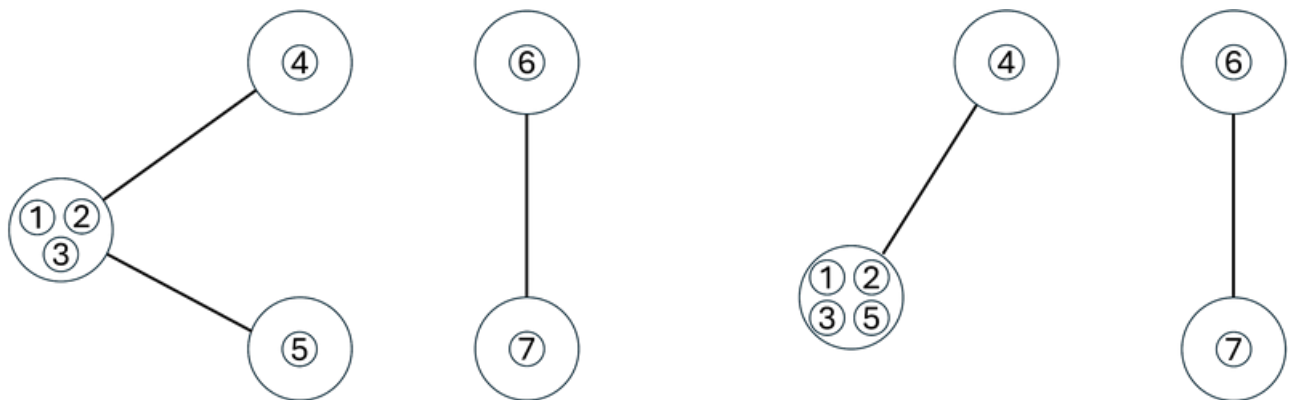
In the 3rd operation, since pieces 2 and 3 are placed on the same vertex,  $G$  remains unchanged, and the number of edges remains 3.

In the 4th operation as well, since pieces 1 and 2 are placed on the same vertex,  $G$  remains unchanged, and the number of edges remains 3.

In the 5th operation, we contract the edge between the vertices where pieces 1 and 5 are placed.

After the operation,  $G$  becomes as shown in the right figure below, and the number of edges becomes 2.

Thus, output 4, 3, 3, 3, 2 in this order, separated by newlines.



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