

## Algorithm Class Mini-Contest 9

# Problem: ROLLING

Time Limit: 1.0 seconds

Memory Limit: 128 MB

**Problem Description** Jacob is playing a ball game on a machine. The machine can be visualised as a rooted tree with  $N$  nodes, numbered from 1 to  $N$ . Each node in the machine can be either empty or filled with a ball. When a ball is at a certain node, it will repeatedly roll down to an empty child node where its subtree contains the minimum node ID, until it is no longer possible.

Jacob will do  $Q$  operations, each being one of two types. The first type of operation asks Jacob to roll  $k$  balls from the root. It is guaranteed that the root is empty at this point in time and  $k$  balls can be inserted. The second type of operation asks Jacob to remove a ball from node  $x$ . It is guaranteed that node  $x$  is filled with a ball at that moment. The balls above node  $x$  will update their positions accordingly.

**Input Format** The first line contains two integers  $N$  and  $Q$ , the number of tree nodes and the number of operations. The next  $N$  lines describe the ball machine. Each of these lines contains one integer, the number of a node: the  $i$ -th of these lines contains the number of node  $i$ 's parent node, or 0 if node  $i$  is the tree root. Each of the next  $Q$  lines contains two integers and describes an operation to be performed. An operation of type 1 is denoted by 1  $k$  where  $k$  is the number of balls to be added to the machine. An operation of type 2 is denoted by 2  $x$  where  $x$  is the number of the node from which a ball is to be removed.

**Output Format** For each operation of type 1, output the number of the node where the last inserted ball ended up. For each operation of type 2 output the number of balls that rolled down after removing the ball from the specified node.

**Limits** These are the bounds on the input.

Subtask	Score	Additional Bounds
1	20	Each node has either 0 or 2 children.
2	26	No balls will roll down after type 2 operations.
3	31	There is exactly one type 1 operation, and it is the first one.
4	23	No other constraints.
All	-	$1 \leq N, Q \leq 10^5$

### Sample Input

```
8 4  
0  
1  
2  
2  
3  
3  
4  
6  
1 8  
2 5  
2 7  
2 8
```

### Sample Output

```
1  
3  
2  
2
```