

Minimum Tree

ZPRAC-16-17-Lab10

[40 points]

A binary tree is a simple data-structure in which each node contains 0 or 2 children. For example:

```
    1 <--- root node
  /  \
 /    \
2      3
/\    /\
4 5 6 7 <--- leaf nodes
```

Such a binary tree can be easily represented in a array as follows:

$A[] = \{1, 2, 3, 4, 5, 6, 7\}$

Here, $A[0] = \text{root}$

and for any index i , index $2*i+1$, $2*i+2$ represent its children.

Let's say you are given the values of leaf nodes and you have to calculate values of every other node as the minimum of all leaf nodes under that node. For example:

```
    2 <--- min(7,2) = 2
  /  \
 /    \
7      2 <--- min(9,7) = 7, min(2,4) = 2
/\    /\
9 7 2 4
```

Thus array will look like $\{2, 7, 2, 9, 7, 2, 4\}$ --- HINT: Calculate this array using recursion.

You will be given the number of leaves and where the index they should start from in the array (for 4 leaves, index is 3). Then the values of leaves will be given.

You have to calculate value for every other node. There will be T queries asking for value of i th node. You have to output this value.

INPUT FORMAT:

N B --- two integers representing number of leaves and beginning index of leaves in array respectively

T --- number of queries

(T integers) --- queries for value of ith node

OUTPUT FORMAT:

(T integers)

EXAMPLE:

INPUT:

4 3

9 7 2 4

5

0 1 4 6 2

OUTPUT:

2

7

7

4

2

Explanation: The tree given is the tree shown in the description. For every query simply output the value at that array index.