Water

time limit per test : 1 second

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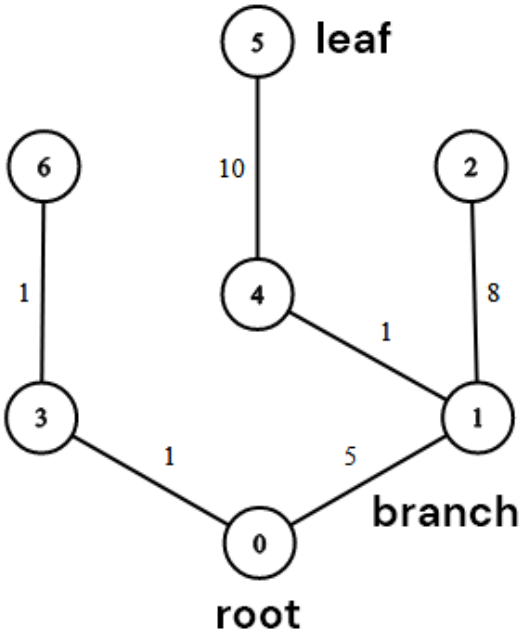
A tree will deliver water from certain point to leaf. Unlike other tree, this tree is a binary tree. Each tree have n point and named $1 <= i <= n+1$. Each point won't have more than 2 branches. Leaf is a point at the end of tree. Find nearest leaf from given point. This is the illustration



Constraints

$1 <= n <= 199$
$1 <= m <= 300$

Input

First line is n and $t.t$ is the name of the root. Then, there are n line of s_i and d_i which the name of point and distance from its parent. Subsequently, there are m and $m-$line of p_i point which you need to find the nearest leaf.

Output

Print m line of answer.

Examples

Test Case 1

Input

```
2 2
1 10
3 5
3
1
2
3
```

Output

```
0
5
0
```

Explanation

Since 1 and 3 is a leaf, the distance is 0. Point 2 is not a leaf, therefore you need to find the nearest leaf, which is 3.