IOI Training Camp 2015

Family Tree

Pushkar got hold of his family relationship tree. The tree describes family relationships of N people, numbered from 1 to N. Each person in the tree has no more than one parent.

Let's call person x a 1-ancestor of person y, if x is the parent of y. Similarly, let's call person x a k-ancestor ($k > 1$) of person y if person x is the $(k-1)$-th ancestor of y's parent.

Family relationships don't form cycles in the given tree. In other words, there is no person who is his own ancestor, directly or indirectly. Let's call two people x and y ($x \neq y$) p-th cousins ($p > 0$) if there is person z who is a p-ancestor of x and also a p-ancestor of y.

Pushkar wonders how many p-th cousins a person in his family has. He takes a piece of paper and writes Q pairs of integers (v_i, p_i). Help him calculate for each pair of integers the number of p_i-th cousins that the person v_i has.

Input

The first line of input will contain integer N. The next line contains N space separated integers, where the i^{th} integer is the parent of the i^{th} node. If this value is 0, it means that the node has no parent.

The next line contains, Q, the number of queries.

The next Q lines will contain two integers, *i.e.*, v_i and p_i.

Output

Print the answer to the queries.

Test Data

In all the subtasks, the integers v_i and p_i are in the range $[1, N]$.

Subtask 1 (20 Points): $N, Q \leq 10^4$.

Subtask 2 (80 Points): $N, Q \leq 10^6$.

Sample Input

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

Sample Output

```
0
0
1
0
0
1
1
```

Limits

Time: 3 seconds

Memory: 256 MB