



Hello, 2024101067.

# Treehouse Quest

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Alice and Bob love exploring their **magical treehouse**, which has  **$n$  rooms** arranged in a **binary tree structure**. Each room (except the root) has **exactly one parent**, and the first room is always the **main hall** at the top. The treehouse is vast, with many interconnected passages, and Alice and Bob often play hide and seek in it.

Whenever Alice wants to meet Bob, she wonders: **What's the shortest path to reach his room?** She can only move through the doors connecting the rooms, and she wants to take the fewest steps possible.

They have a **map** of the treehouse given as a **parent list**, where each number tells which room is directly connected above it. Now, for  **$q$  questions**, Alice and Bob will ask how far apart their rooms are. Can you help them find the answer?

## Input Format

- The first line contains two integers  **$n$**  and  **$q$** , the number of rooms and the number of queries.
- The second line contains  **$n$**  space-separated integers representing the parent array  **$P$** , where the  **$i$ -th** number represents the parent of room  **$i$**  (or  **$-1$**  for the main hall).
- The next  **$q$**  lines each contain two integers  **$X$**  and  **$Y$** , representing Alice's and Bob's room respectively, and you must determine how many doors separate them.

## Output Format

For each query, print a single number on a new line — the minimum number of doors Alice needs to pass through to reach Bob's room.

## Constraints

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## Sample Input

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

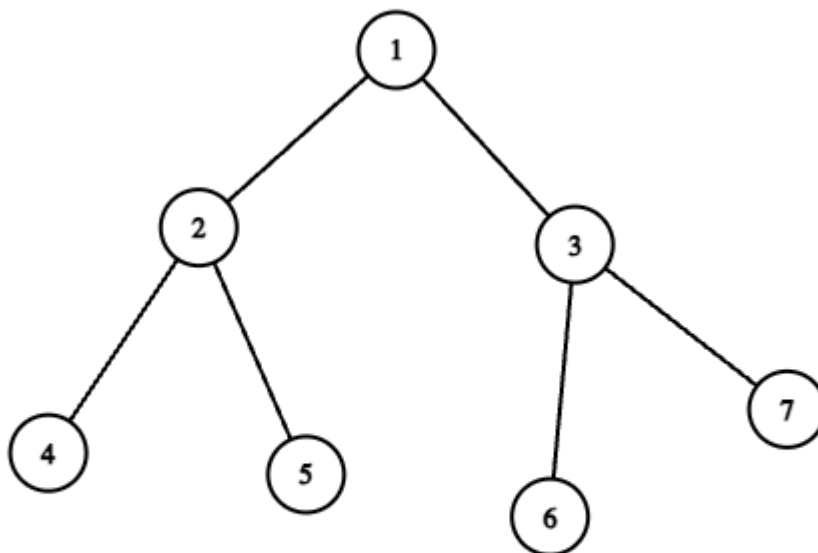
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## Sample Output:

```
2
4
3
```

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## Sample Explanation:



- Distance between 4 and 5 → ( 4 to 2 to 5 ) → **2 doors**.

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## ? Clarifications

[Request clarification](#)

No clarifications have been made at this time.