2204. Distance to a Cycle in Undirected Graph Premium

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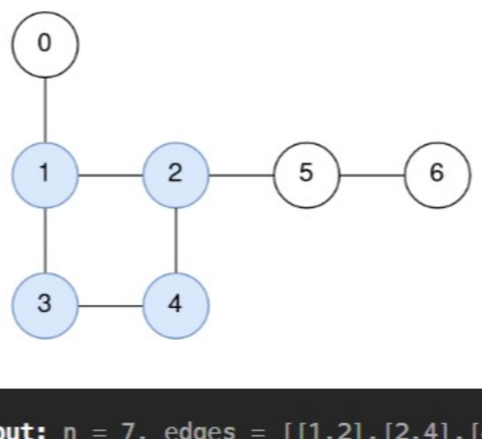
You are given a positive integer `n` representing the number of nodes in a **connected undirected graph** containing **exactly one** cycle. The nodes are numbered from `0` to `n - 1` (**inclusive**).

You are also given a 2D integer array `edges`, where `edges[i] = [node1ᵢ, node2ᵢ]` denotes that there is a **bidirectional** edge connecting `node1ᵢ` and `node2ᵢ` in the graph.

The distance between two nodes `a` and `b` is defined to be the **minimum** number of edges that are needed to go from `a` to `b`.

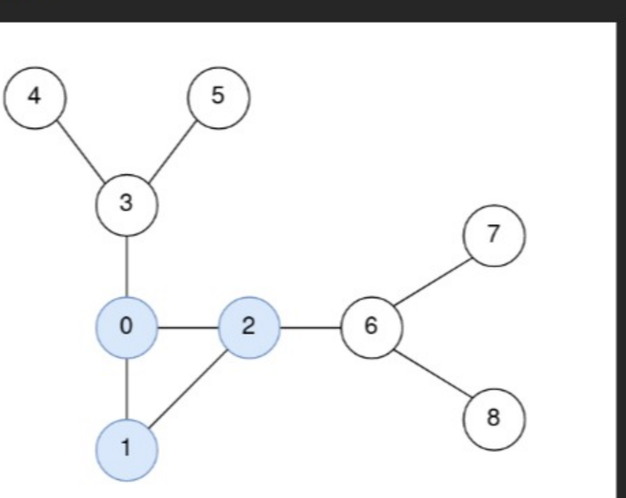
Return *an integer array* `answer` *of size* `n`*, where* `answer[i]` *is the* ***minimum*** *distance between the* `iᵗʰ` *node and* ***any*** *node in the cycle.*

Example 1:




```
Input: n = 7, edges = [[1,2],[2,4],[4,3],[3,1],[0,1],[5,2],[6,5]]
Output: [1,0,0,0,0,1,2]
Explanation:
The nodes 1, 2, 3, and 4 form the cycle.
The distance from 0 to 1 is 1.
The distance from 1 to 1 is 0.
The distance from 2 to 2 is 0.
The distance from 3 to 3 is 0.
The distance from 4 to 4 is 0.
The distance from 5 to 2 is 1.
The distance from 6 to 2 is 2.
```

Example 2:




```
Input: n = 9, edges = [[0,1],[1,2],[0,2],[2,6],[6,7],[6,8],[0,3],[3,4],[3,5]]
Output: [0,0,0,1,2,2,1,2,2]
Explanation:
The nodes 0, 1, and 2 form the cycle.
The distance from 0 to 0 is 0.
The distance from 1 to 1 is 0.
The distance from 2 to 2 is 0.
The distance from 3 to 1 is 1.
The distance from 4 to 1 is 2.
The distance from 5 to 1 is 2.
The distance from 6 to 2 is 1.
The distance from 7 to 2 is 2.
The distance from 8 to 2 is 2.
```

Constraints:

- `3 <= n <= 10⁵`
- `edges.length == n`
- `edges[i].length == 2`
- `0 <= node1ᵢ, node2ᵢ <= n - 1`
- `node1ᵢ != node2ᵢ`
- The graph is connected.
- The graph has exactly one cycle.
- There is at most one edge between any pair of vertices.

Seen this question in a real interview before? 1/5

Yes No

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Hint 1

This problem can be broken down into two parts: finding the cycle, and finding the distance between each node and the cycle.

Hint 2

How can we find the cycle? We can use DFS and keep track of the nodes we've seen, and the order that we see them in. Once we see a node we've already visited, we know that the cycle contains the node that was seen twice and all the nodes that we visited in between.

Hint 3

Now that we know which nodes are part of the cycle, how can we find the distances? We can run a multi-source BFS starting from the nodes in the cycle and expanding outward.

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