

Problem 3243: Shortest Distance After Road Addition Queries I

Problem Information

Difficulty: **Medium**

Acceptance Rate: 0.00%

Paid Only: No

Problem Description

You are given an integer

n

and a 2D integer array

queries

There are

n

cities numbered from

0

to

$n - 1$

. Initially, there is a

unidirectional

road from city

i

to city

$i + 1$

for all

$0 \leq i < n - 1$

.

queries[i] = [u

i

, v

i

]

represents the addition of a new

unidirectional

road from city

u

i

to city

v

i

. After each query, you need to find the

length

of the

shortest path

from city

0

to city

n - 1

.

Return an array

answer

where for each

i

in the range

[0, queries.length - 1]

,

answer[i]

is the

length of the shortest path

from city

0

to city

$n - 1$

after processing the

first

$i + 1$

queries.

Example 1:

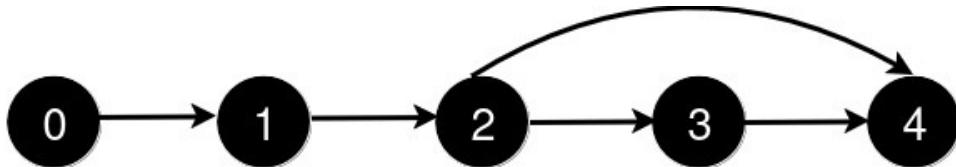
Input:

$n = 5$, queries = [[2,4],[0,2],[0,4]]

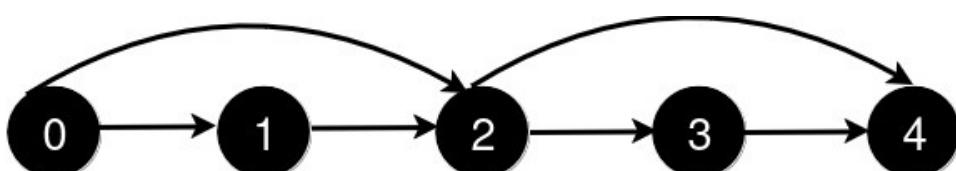
Output:

[3,2,1]

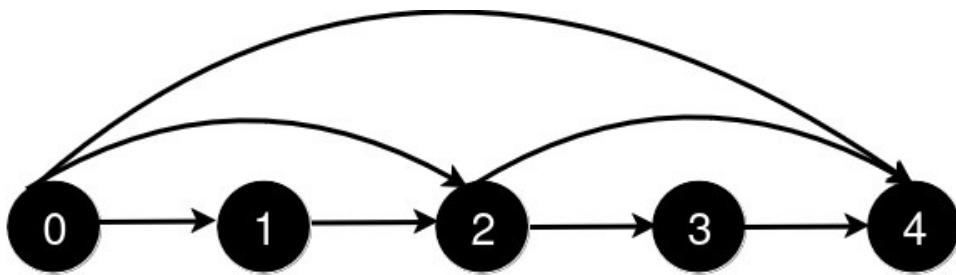
Explanation:



After the addition of the road from 2 to 4, the length of the shortest path from 0 to 4 is 3.



After the addition of the road from 0 to 2, the length of the shortest path from 0 to 4 is 2.



After the addition of the road from 0 to 4, the length of the shortest path from 0 to 4 is 1.

Example 2:

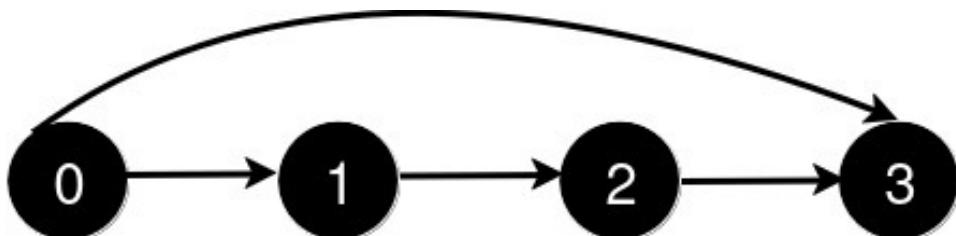
Input:

$n = 4$, queries = $[[0,3],[0,2]]$

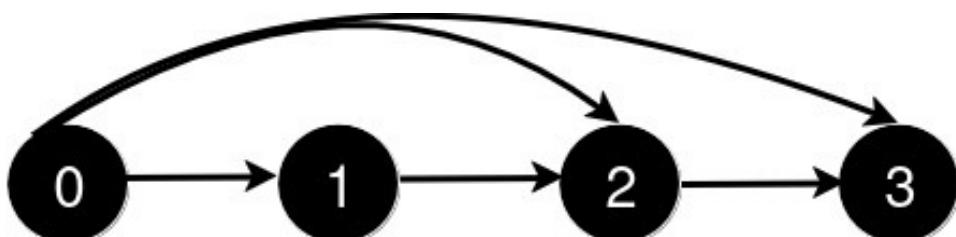
Output:

[1,1]

Explanation:



After the addition of the road from 0 to 3, the length of the shortest path from 0 to 3 is 1.



After the addition of the road from 0 to 2, the length of the shortest path remains 1.

Constraints:

$3 \leq n \leq 500$

$1 \leq \text{queries.length} \leq 500$

$\text{queries}[i].length == 2$

$0 \leq \text{queries}[i][0] < \text{queries}[i][1] < n$

$1 < \text{queries}[i][1] - \text{queries}[i][0]$

There are no repeated roads among the queries.

Code Snippets

C++:

```
class Solution {
public:
    vector<int> shortestDistanceAfterQueries(int n, vector<vector<int>>& queries)
    {
    }
};
```

Java:

```
class Solution {
    public int[] shortestDistanceAfterQueries(int n, int[][] queries) {
    }
}
```

Python3:

```
class Solution:
    def shortestDistanceAfterQueries(self, n: int, queries: List[List[int]]) ->
        List[int]:
```

Python:

```
class Solution(object):
    def shortestDistanceAfterQueries(self, n, queries):
        """
        :type n: int
        :type queries: List[List[int]]
        :rtype: List[int]
        """

```

JavaScript:

```
/**
 * @param {number} n
 * @param {number[][]} queries
 * @return {number[]}
 */
var shortestDistanceAfterQueries = function(n, queries) {
}
```

TypeScript:

```
function shortestDistanceAfterQueries(n: number, queries: number[][]): number[] {
}
```

C#:

```
public class Solution {
    public int[] ShortestDistanceAfterQueries(int n, int[][] queries) {
    }
}
```

C:

```
/**
 * Note: The returned array must be malloced, assume caller calls free().
 */
int* shortestDistanceAfterQueries(int n, int** queries, int queriesSize, int*
queriesColSize, int* returnSize) {
}
```

Go:

```
func shortestDistanceAfterQueries(n int, queries [][]int) []int {  
}  
}
```

Kotlin:

```
class Solution {  
    fun shortestDistanceAfterQueries(n: Int, queries: Array<IntArray>): IntArray {  
        // Implementation  
    }  
}
```

Swift:

```
class Solution {  
    func shortestDistanceAfterQueries(_ n: Int, _ queries: [[Int]]) -> [Int] {  
        // Implementation  
    }  
}
```

Rust:

```
impl Solution {  
    pub fn shortest_distance_after_queries(n: i32, queries: Vec<Vec<i32>>) ->  
        Vec<i32> {  
            // Implementation  
    }  
}
```

Ruby:

```
# @param {Integer} n  
# @param {Integer[][]} queries  
# @return {Integer[]}  
def shortest_distance_after_queries(n, queries)  
  
end
```

PHP:

```

class Solution {

    /**
     * @param Integer $n
     * @param Integer[][] $queries
     * @return Integer[]
     */
    function shortestDistanceAfterQueries($n, $queries) {

    }
}

```

Dart:

```

class Solution {
List<int> shortestDistanceAfterQueries(int n, List<List<int>> queries) {
}
}

```

Scala:

```

object Solution {
def shortestDistanceAfterQueries(n: Int, queries: Array[Array[Int]]):
Array[Int] = {
}
}

```

Elixir:

```

defmodule Solution do
@spec shortest_distance_after_queries(n :: integer, queries :: [[integer]])
:: [integer]
def shortest_distance_after_queries(n, queries) do
end
end

```

Erlang:

```

-spec shortest_distance_after_queries(N :: integer(), Queries :: [[integer()]]) -> [integer()].

```

```
shortest_distance_after_queries(N, Queries) ->
.
```

Racket:

```
(define/contract (shortest-distance-after-queries n queries)
  (-> exact-integer? (listof (listof exact-integer?)) (listof exact-integer?))
)
```

Solutions

C++ Solution:

```
/*
 * Problem: Shortest Distance After Road Addition Queries I
 * Difficulty: Medium
 * Tags: array, graph, search
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(1) to O(n) depending on approach
 */

class Solution {
public:
    vector<int> shortestDistanceAfterQueries(int n, vector<vector<int>>& queries)
    {

    }
};
```

Java Solution:

```
/**
 * Problem: Shortest Distance After Road Addition Queries I
 * Difficulty: Medium
 * Tags: array, graph, search
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
```

```

* Space Complexity: O(1) to O(n) depending on approach
*/



class Solution {
    public int[] shortestDistanceAfterQueries(int n, int[][] queries) {

    }
}

```

Python3 Solution:

```

"""
Problem: Shortest Distance After Road Addition Queries I
Difficulty: Medium
Tags: array, graph, search

Approach: Use two pointers or sliding window technique
Time Complexity: O(n) or O(n log n)
Space Complexity: O(1) to O(n) depending on approach
"""

class Solution:

    def shortestDistanceAfterQueries(self, n: int, queries: List[List[int]]) ->
        List[int]:
        # TODO: Implement optimized solution
        pass

```

Python Solution:

```

class Solution(object):

    def shortestDistanceAfterQueries(self, n, queries):
        """
        :type n: int
        :type queries: List[List[int]]
        :rtype: List[int]
        """

```

JavaScript Solution:

```

/**
 * Problem: Shortest Distance After Road Addition Queries I

```

```

* Difficulty: Medium
* Tags: array, graph, search
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* Space Complexity: O(1) to O(n) depending on approach
*/

```

```

/**
* @param {number} n
* @param {number[][]} queries
* @return {number[]}
*/
var shortestDistanceAfterQueries = function(n, queries) {
}

```

TypeScript Solution:

```

/**
* Problem: Shortest Distance After Road Addition Queries I
* Difficulty: Medium
* Tags: array, graph, search
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* Space Complexity: O(1) to O(n) depending on approach
*/

```

```

function shortestDistanceAfterQueries(n: number, queries: number[][]):
number[] {
}

```

C# Solution:

```

/*
* Problem: Shortest Distance After Road Addition Queries I
* Difficulty: Medium
* Tags: array, graph, search
*
```

```

* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* Space Complexity: O(1) to O(n) depending on approach
*/
public class Solution {
    public int[] ShortestDistanceAfterQueries(int n, int[][] queries) {
        }
    }
}

```

C Solution:

```

/*
 * Problem: Shortest Distance After Road Addition Queries I
 * Difficulty: Medium
 * Tags: array, graph, search
 *
 * Approach: Use two pointers or sliding window technique
 * Time Complexity: O(n) or O(n log n)
 * Space Complexity: O(1) to O(n) depending on approach
*/
/***
 * Note: The returned array must be malloced, assume caller calls free().
 */
int* shortestDistanceAfterQueries(int n, int** queries, int queriesSize, int*
queriesColSize, int* returnSize) {

}

```

Go Solution:

```

// Problem: Shortest Distance After Road Addition Queries I
// Difficulty: Medium
// Tags: array, graph, search
//
// Approach: Use two pointers or sliding window technique
// Time Complexity: O(n) or O(n log n)
// Space Complexity: O(1) to O(n) depending on approach

```

```
func shortestDistanceAfterQueries(n int, queries [][]int) []int {  
    ...  
}
```

Kotlin Solution:

```
class Solution {  
    fun shortestDistanceAfterQueries(n: Int, queries: Array<IntArray>): IntArray  
    {  
        // Implementation  
    }  
}
```

Swift Solution:

```
class Solution {
    func shortestDistanceAfterQueries(_ n: Int, _ queries: [[Int]]) -> [Int] {
        ...
    }
}
```

Rust Solution:

```
// Problem: Shortest Distance After Road Addition Queries I
// Difficulty: Medium
// Tags: array, graph, search
//
// Approach: Use two pointers or sliding window technique
// Time Complexity: O(n) or O(n log n)
// Space Complexity: O(1) to O(n) depending on approach

impl Solution {
    pub fn shortest_distance_after_queries(n: i32, queries: Vec<Vec<i32>>) ->
        Vec<i32> {
    }

    }
}
```

Ruby Solution:

```

# @param {Integer} n
# @param {Integer[][]} queries
# @return {Integer[]}
def shortest_distance_after_queries(n, queries)

end

```

PHP Solution:

```

class Solution {

    /**
     * @param Integer $n
     * @param Integer[][] $queries
     * @return Integer[]
     */
    function shortestDistanceAfterQueries($n, $queries) {

    }
}

```

Dart Solution:

```

class Solution {
List<int> shortestDistanceAfterQueries(int n, List<List<int>> queries) {
}
}

```

Scala Solution:

```

object Solution {
def shortestDistanceAfterQueries(n: Int, queries: Array[Array[Int]]):
Array[Int] = {
}
}

```

Elixir Solution:

```

defmodule Solution do
@spec shortest_distance_after_queries(n :: integer, queries :: [[integer]])

```

```
:: [integer]  
def shortest_distance_after_queries(n, queries) do  
  
end  
end
```

Erlang Solution:

```
-spec shortest_distance_after_queries(N :: integer(), Queries ::  
[[integer()]]) -> [integer()].  
shortest_distance_after_queries(N, Queries) ->  
. 
```

Racket Solution:

```
(define/contract (shortest-distance-after-queries n queries)  
(-> exact-integer? (listof (listof exact-integer?)) (listof exact-integer?))  
)
```