Problem 3015: Count the Number of Houses at a Certain Distance I

Problem Information

Difficulty: Medium
Acceptance Rate: 0.00%
Paid Only: No

Problem Description

You are given three

positive

integers

n

,

x

, and

y

.

In a city, there exist houses numbered

1

to

n

connected by

n

streets. There is a street connecting the house numbered

i

with the house numbered

i + 1

for all

1 <= i <= n - 1

. An additional street connects the house numbered

x

with the house numbered

y

.

For each

k

, such that

1 <= k <= n

, you need to find the number of

pairs of houses

(house

1

, house

2

)

such that the

minimum

number of streets that need to be traveled to reach

house

2

from

house

1

is

k

.

Return

a

1-indexed

array

result

of length

n

where

result[k]

represents the

total

number of pairs of houses such that the

minimum

streets required to reach one house from the other is

k

.

Note

that

x

and

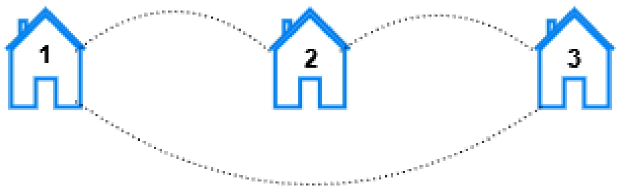
y

can be

equal

.

Example 1:



Input:

n = 3, x = 1, y = 3

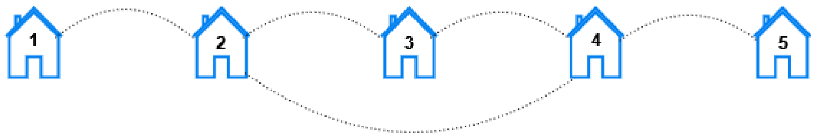
Output:

[6,0,0]

Explanation:

Let's look at each pair of houses: - For the pair (1, 2), we can go from house 1 to house 2 directly. - For the pair (2, 1), we can go from house 2 to house 1 directly. - For the pair (1, 3), we can go from house 1 to house 3 directly. - For the pair (3, 1), we can go from house 3 to house 1 directly. - For the pair (2, 3), we can go from house 2 to house 3 directly. - For the pair (3, 2), we can go from house 3 to house 2 directly.

Example 2:



Input:

n = 5, x = 2, y = 4

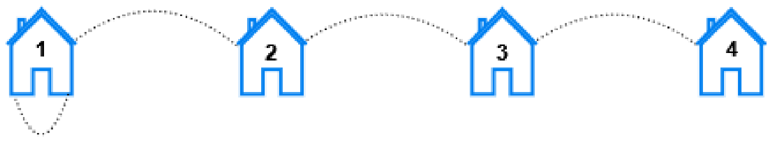
Output:

[10,8,2,0,0]

Explanation:

For each distance k the pairs are: - For k == 1, the pairs are (1, 2), (2, 1), (2, 3), (3, 2), (2, 4), (4, 2), (3, 4), (4, 3), (4, 5), and (5, 4). - For k == 2, the pairs are (1, 3), (3, 1), (1, 4), (4, 1), (2, 5), (5, 2), (3, 5), and (5, 3). - For k == 3, the pairs are (1, 5), and (5, 1). - For k == 4 and k == 5, there are no pairs.

Example 3:



Input:

n = 4, x = 1, y = 1

Output:

[6,4,2,0]

Explanation:

For each distance k the pairs are: - For k == 1, the pairs are (1, 2), (2, 1), (2, 3), (3, 2), (3, 4), and (4, 3). - For k == 2, the pairs are (1, 3), (3, 1), (2, 4), and (4, 2). - For k == 3, the pairs are (1, 4), and (4, 1). - For k == 4, there are no pairs.

Constraints:

2 <= n <= 100

1 <= x, y <= n

Code Snippets

C++:

```
class Solution {
public:
vector<int> countOfPairs(int n, int x, int y) {

}
};
```

Java:

```
class Solution {
public int[] countOfPairs(int n, int x, int y) {

}
}
```

Python3:

```
class Solution:
def countOfPairs(self, n: int, x: int, y: int) -> List[int]:
```

Python:

```
class Solution(object):
def countOfPairs(self, n, x, y):
"""
:type n: int
:type x: int
:type y: int
:rtype: List[int]
"""
```

JavaScript:

```
/**
* @param {number} n
* @param {number} x
* @param {number} y
* @return {number[]}
*/
var countOfPairs = function(n, x, y) {

};
```

TypeScript:

```
function countOfPairs(n: number, x: number, y: number): number[] {

};
```

C#:

```
public class Solution {
public int[] CountOfPairs(int n, int x, int y) {

}
}
```

C:

```
/**
* Note: The returned array must be malloced, assume caller calls free().
*/
int* countOfPairs(int n, int x, int y, int* returnSize) {

}
```

Go:

```
func countOfPairs(n int, x int, y int) []int {

}
```

Kotlin:

```
class Solution {
fun countOfPairs(n: Int, x: Int, y: Int): IntArray {

}
}
```

Swift:

```
class Solution {
func countOfPairs(_ n: Int, _ x: Int, _ y: Int) -> [Int] {

}
}
```

Rust:

```
impl Solution {
pub fn count_of_pairs(n: i32, x: i32, y: i32) -> Vec<i32> {

}
}
```

Ruby:

```
# @param {Integer} n
# @param {Integer} x
# @param {Integer} y
# @return {Integer[]}
def count_of_pairs(n, x, y)

end
```

PHP:

```
class Solution {

/**
* @param Integer $n
* @param Integer $x
* @param Integer $y
* @return Integer[]
*/
function countOfPairs($n, $x, $y) {

}
}
```

Dart:

```
class Solution {
List<int> countOfPairs(int n, int x, int y) {

}
}
```

Scala:

```
object Solution {
def countOfPairs(n: Int, x: Int, y: Int): Array[Int] = {

}
}
```

Elixir:

```
defmodule Solution do
@spec count_of_pairs(n :: integer, x :: integer, y :: integer) :: [integer]
def count_of_pairs(n, x, y) do

end
end
```

Erlang:

```
-spec count_of_pairs(N :: integer(), X :: integer(), Y :: integer()) ->
[integer()].
count_of_pairs(N, X, Y) ->
.
```

Racket:

```
(define/contract (count-of-pairs n x y)
(-> exact-integer? exact-integer? exact-integer? (listof exact-integer?))
)
```

Solutions

C++ Solution:

```
/*
* Problem: Count the Number of Houses at a Certain Distance I
* Difficulty: Medium
* Tags: array, tree, graph, search
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* Space Complexity: O(h) for recursion stack where h is height
*/

class Solution {
public:
vector<int> countOfPairs(int n, int x, int y) {

}
};
```

Java Solution:

```
/**
* Problem: Count the Number of Houses at a Certain Distance I
* Difficulty: Medium
* Tags: array, tree, graph, search
*
* Approach: Use two pointers or sliding window technique
* Time Complexity: O(n) or O(n log n)
* Space Complexity: O(h) for recursion stack where h is height
*/

class Solution {
public int[] countOfPairs(int n, int x, int y) {

}
}
```

Python3 Solution:

```
"""
Problem: Count the Number of Houses at a Certain Distance I
Difficulty: Medium
Tags: array, tree, graph, search
```

```
Approach: Use two pointers or sliding window technique
Time Complexity: O(n) or O(n log n)
Space Complexity: O(h) for recursion stack where h is height
"""

class Solution:
def countOfPairs(self, n: int, x: int, y: int) -> List[int]:
# TODO: Implement optimized solution
pass
```

Python Solution:

```
class Solution(object):
def countOfPairs(self, n, x, y):
"""
:type n: int
:type x: int
:type y: int
:rtype: List[int]
"""
```

JavaScript Solution:

```
/**
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*/

/**
* @param {number} n
* @param {number} x
* @param {number} y
* @return {number[]}
*/
var countOfPairs = function(n, x, y) {
};
```

TypeScript Solution:

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*/

function countOfPairs(n: number, x: number, y: number): number[] {

};
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C# Solution:

```
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public class Solution {
public int[] CountOfPairs(int n, int x, int y) {

}
}
```

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*/

/**
* Note: The returned array must be malloced, assume caller calls free().
*/
int* countOfPairs(int n, int x, int y, int* returnSize) {

}
```

Go Solution:

```
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// Difficulty: Medium
// Tags: array, tree, graph, search
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// Approach: Use two pointers or sliding window technique
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func countOfPairs(n int, x int, y int) []int {

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impl Solution {
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Ruby Solution:

```
# @param {Integer} n
# @param {Integer} x
# @param {Integer} y
# @return {Integer[]}
def count_of_pairs(n, x, y)

end
```

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```
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/**
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* @param Integer $x
* @param Integer $y
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