

# Problem 1414: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K

## Problem Information

Difficulty: Medium

Acceptance Rate: 0.00%

Paid Only: No

## Problem Description

Given an integer

k

,

return the minimum number of Fibonacci numbers whose sum is equal to

k

. The same Fibonacci number can be used multiple times.

The Fibonacci numbers are defined as:

F

1

= 1

F

2

= 1

F

n

= F

n-1

+ F

n-2

for

$n > 2$ .

It is guaranteed that for the given constraints we can always find such Fibonacci numbers that sum up to

k

.

Example 1:

Input:

$k = 7$

Output:

2

Explanation:

The Fibonacci numbers are: 1, 1, 2, 3, 5, 8, 13, ... For  $k = 7$  we can use  $2 + 5 = 7$ .

Example 2:

Input:

$k = 10$

Output:

2

Explanation:

For  $k = 10$  we can use  $2 + 8 = 10$ .

Example 3:

Input:

$k = 19$

Output:

3

Explanation:

For  $k = 19$  we can use  $1 + 5 + 13 = 19$ .

Constraints:

$1 \leq k \leq 10$

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## Code Snippets

C++:

```
class Solution {  
public:
```

```
int findMinFibonacciNumbers(int k) {  
}  
};
```

### Java:

```
class Solution {  
    public int findMinFibonacciNumbers(int k) {  
    }  
}
```

### Python3:

```
class Solution:  
    def findMinFibonacciNumbers(self, k: int) -> int:
```

### Python:

```
class Solution(object):  
    def findMinFibonacciNumbers(self, k):  
        """  
        :type k: int  
        :rtype: int  
        """
```

### JavaScript:

```
/**  
 * @param {number} k  
 * @return {number}  
 */  
var findMinFibonacciNumbers = function(k) {  
};
```

### TypeScript:

```
function findMinFibonacciNumbers(k: number): number {  
};
```

**C#:**

```
public class Solution {  
    public int FindMinFibonacciNumbers(int k) {  
        }  
        }
```

**C:**

```
int findMinFibonacciNumbers(int k) {  
    }
```

**Go:**

```
func findMinFibonacciNumbers(k int) int {  
    }
```

**Kotlin:**

```
class Solution {  
    fun findMinFibonacciNumbers(k: Int): Int {  
        }  
        }
```

**Swift:**

```
class Solution {  
    func findMinFibonacciNumbers(_ k: Int) -> Int {  
        }  
        }
```

**Rust:**

```
impl Solution {  
    pub fn find_min_fibonacci_numbers(k: i32) -> i32 {  
        }  
        }
```

**Ruby:**

```
# @param {Integer} k
# @return {Integer}
def find_min_fibonacci_numbers(k)

end
```

**PHP:**

```
class Solution {

    /**
     * @param Integer $k
     * @return Integer
     */
    function findMinFibonacciNumbers($k) {

    }
}
```

**Dart:**

```
class Solution {
  int findMinFibonacciNumbers(int k) {
    }
}
```

**Scala:**

```
object Solution {
  def findMinFibonacciNumbers(k: Int) = {
    }
}
```

**Elixir:**

```
defmodule Solution do
  @spec find_min_fibonacci_numbers(k :: integer) :: integer
  def find_min_fibonacci_numbers(k) do
```

```
end  
end
```

### Erlang:

```
-spec find_min_fibonacci_numbers(K :: integer()) -> integer().  
find_min_fibonacci_numbers(K) ->  
.
```

### Racket:

```
(define/contract (find-min-fibonacci-numbers k)  
  (-> exact-integer? exact-integer?)  
  )
```

## Solutions

### C++ Solution:

```
/*  
 * Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K  
 * Difficulty: Medium  
 * Tags: greedy, math  
 *  
 * Approach: Greedy algorithm with local optimal choices  
 * Time Complexity: O(n) to O(n^2) depending on approach  
 * Space Complexity: O(1) to O(n) depending on approach  
 */  
  
class Solution {  
public:  
    int findMinFibonacciNumbers(int k) {  
  
    }  
};
```

### Java Solution:

```
/**  
 * Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
```

```

* Difficulty: Medium
* Tags: greedy, math
*
* Approach: Greedy algorithm with local optimal choices
* Time Complexity: O(n) to O(n^2) depending on approach
* Space Complexity: O(1) to O(n) depending on approach
*/

```

```

class Solution {
public int findMinFibonacciNumbers(int k) {

}
}

```

### Python3 Solution:

```

"""
Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
Difficulty: Medium
Tags: greedy, math

Approach: Greedy algorithm with local optimal choices
Time Complexity: O(n) to O(n^2) depending on approach
Space Complexity: O(1) to O(n) depending on approach
"""

class Solution:
    def findMinFibonacciNumbers(self, k: int) -> int:
        # TODO: Implement optimized solution
        pass

```

### Python Solution:

```

class Solution(object):
    def findMinFibonacciNumbers(self, k):
        """
        :type k: int
        :rtype: int
        """

```

### JavaScript Solution:

```

/**
 * Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
 * Difficulty: Medium
 * Tags: greedy, math
 *
 * Approach: Greedy algorithm with local optimal choices
 * Time Complexity: O(n) to O(n^2) depending on approach
 * Space Complexity: O(1) to O(n) depending on approach
 */

/**
 * @param {number} k
 * @return {number}
 */
var findMinFibonacciNumbers = function(k) {

};

```

### TypeScript Solution:

```

/**
 * Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
 * Difficulty: Medium
 * Tags: greedy, math
 *
 * Approach: Greedy algorithm with local optimal choices
 * Time Complexity: O(n) to O(n^2) depending on approach
 * Space Complexity: O(1) to O(n) depending on approach
 */

function findMinFibonacciNumbers(k: number): number {
}

```

### C# Solution:

```

/*
 * Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
 * Difficulty: Medium
 * Tags: greedy, math
 *
 * Approach: Greedy algorithm with local optimal choices

```

```

* Time Complexity: O(n) to O(n^2) depending on approach
* Space Complexity: O(1) to O(n) depending on approach
*/
public class Solution {
    public int FindMinFibonacciNumbers(int k) {
        }
    }
}

```

## C Solution:

```

/*
 * Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
 * Difficulty: Medium
 * Tags: greedy, math
 *
 * Approach: Greedy algorithm with local optimal choices
 * Time Complexity: O(n) to O(n^2) depending on approach
 * Space Complexity: O(1) to O(n) depending on approach
*/
int findMinFibonacciNumbers(int k) {
}

```

## Go Solution:

```

// Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K
// Difficulty: Medium
// Tags: greedy, math
//
// Approach: Greedy algorithm with local optimal choices
// Time Complexity: O(n) to O(n^2) depending on approach
// Space Complexity: O(1) to O(n) depending on approach

func findMinFibonacciNumbers(k int) int {
}

```

## Kotlin Solution:

```
class Solution {  
    fun findMinFibonacciNumbers(k: Int): Int {  
        }  
        }  
}
```

### Swift Solution:

```
class Solution {  
    func findMinFibonacciNumbers(_ k: Int) -> Int {  
        }  
        }  
}
```

### Rust Solution:

```
// Problem: Find the Minimum Number of Fibonacci Numbers Whose Sum Is K  
// Difficulty: Medium  
// Tags: greedy, math  
//  
// Approach: Greedy algorithm with local optimal choices  
// Time Complexity: O(n) to O(n^2) depending on approach  
// Space Complexity: O(1) to O(n) depending on approach  
  
impl Solution {  
    pub fn find_min_fibonacci_numbers(k: i32) -> i32 {  
        }  
        }  
}
```

### Ruby Solution:

```
# @param {Integer} k  
# @return {Integer}  
def find_min_fibonacci_numbers(k)  
  
end
```

### PHP Solution:

```
class Solution {
```

```
/**  
 * @param Integer $k  
 * @return Integer  
 */  
function findMinFibonacciNumbers($k) {  
  
}  
}
```

### Dart Solution:

```
class Solution {  
int findMinFibonacciNumbers(int k) {  
  
}  
}
```

### Scala Solution:

```
object Solution {  
def findMinFibonacciNumbers(k: Int): Int = {  
  
}  
}
```

### Elixir Solution:

```
defmodule Solution do  
@spec find_min_fibonacci_numbers(k :: integer) :: integer  
def find_min_fibonacci_numbers(k) do  
  
end  
end
```

### Erlang Solution:

```
-spec find_min_fibonacci_numbers(K :: integer()) -> integer().  
find_min_fibonacci_numbers(K) ->  
.
```

### Racket Solution:

```
(define/contract (find-min-fibonacci-numbers k)
  (-> exact-integer? exact-integer?))
```