

Problem 375: Guess Number Higher or Lower II

Problem Information

Difficulty: Medium

Acceptance Rate: 52.05%

Paid Only: No

Tags: Math, Dynamic Programming, Game Theory

Problem Description

We are playing the Guessing Game. The game will work as follows:

1. I pick a number between 1 and n . 2. You guess a number. 3. If you guess the right number, **you win the game**. 4. If you guess the wrong number, then I will tell you whether the number I picked is **higher or lower**, and you will continue guessing. 5. Every time you guess a wrong number x , you will pay x dollars. If you run out of money, **you lose the game**.

Given a particular n , return the minimum amount of money you need to guarantee a win regardless of what number I pick.

Example 1:



Input: $n = 10$ **Output:** 16 **Explanation:** The winning strategy is as follows: - The range is $[1, 10]$. Guess 7. - If this is my number, your total is \$0. Otherwise, you pay \$7. - If my number is higher, the range is $[8, 10]$. Guess 9. - If this is my number, your total is \$7. Otherwise, you pay \$9. - If my number is higher, it must be 10. Guess 10. Your total is \$7 + \$9 = \$16. - If my number is lower, it must be 8. Guess 8. Your total is \$7 + \$9 = \$16. - If my number is lower, the range is $[1, 6]$. Guess 3. - If this is my number, your total is \$7. Otherwise, you pay \$3. - If my number is higher, the range is $[4, 6]$. Guess 5. - If this is my number, your total is \$7 + \$3 = \$10. Otherwise, you pay \$5. - If my number is higher, it must be 6. Guess 6. Your total is \$7 + \$3 + \$5 = \$15. - If my number is lower, it must be 4. Guess 4. Your total is \$7 + \$3 + \$5 = \$15. - If my number is lower, the range is $[1, 2]$. Guess 1. - If this is my number, your total is \$7 + \$3 = \$10. Otherwise, you pay \$1. - If my number is higher, it must be 2. Guess 2. Your total is \$7 + \$3 + \$1 = \$11. The worst case in all these scenarios is that you

pay \$16. Hence, you only need \$16 to guarantee a win.

****Example 2:****

****Input:**** n = 1 ****Output:**** 0 ****Explanation:**** There is only one possible number, so you can guess 1 and not have to pay anything.

****Example 3:****

****Input:**** n = 2 ****Output:**** 1 ****Explanation:**** There are two possible numbers, 1 and 2. - Guess 1. - If this is my number, your total is \$0. Otherwise, you pay \$1. - If my number is higher, it must be 2. Guess 2. Your total is \$1. The worst case is that you pay \$1.

****Constraints:****

* `1 <= n <= 200`

Code Snippets

C++:

```
class Solution {
public:
    int getMoneyAmount(int n) {

    }
};
```

Java:

```
class Solution {
    public int getMoneyAmount(int n) {

    }
}
```

Python3:

```
class Solution:
    def getMoneyAmount(self, n: int) -> int:
```

