375. Guess Number Higher or Lower II

Difficulty : Medium

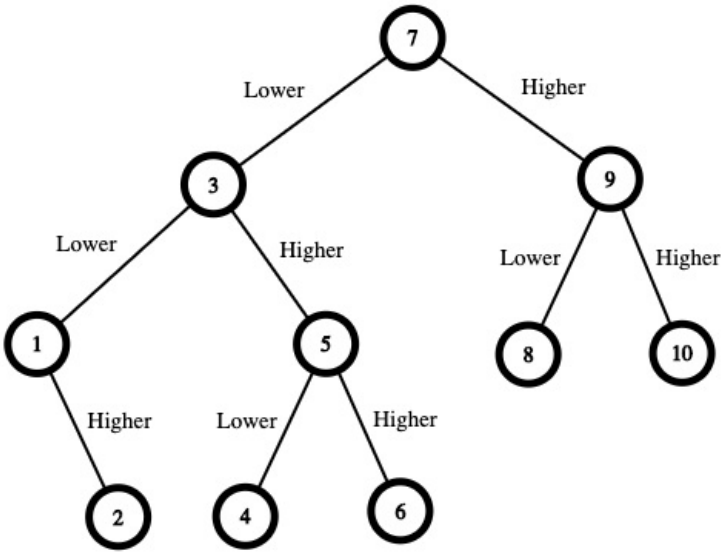
https://leetcode.com/problems/guess-number-higher-or-lower-ii

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:

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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.
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Example 2:

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Input: n = 1
Output: 0
Explanation: There is only one possible number, so you can guess 1 and not have to pay anything.
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Example 3:

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Input: n = 2
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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