

375. Guess Number Higher or Lower II

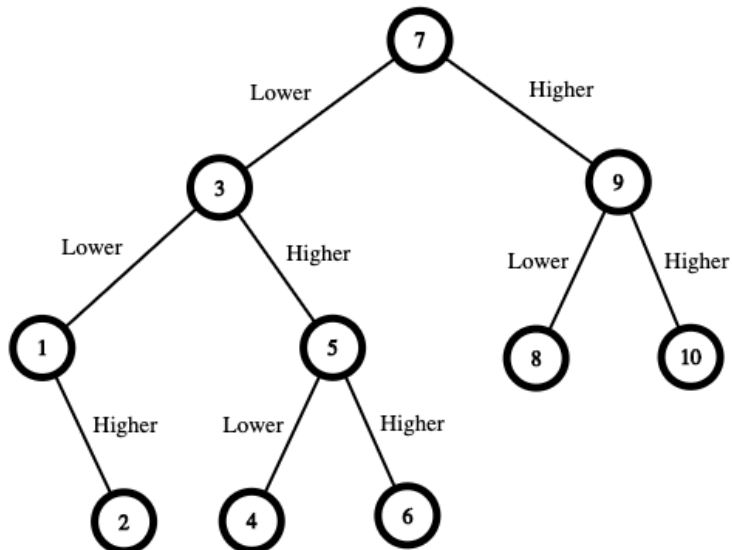
Hint

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:

- $1 \leq n \leq 200$