

House Robber

Rob max money — no two adjacent houses ■

● MEDIUM

■ Hook

You're a robber on a street. Each house has some money. But if you rob two adjacent houses, the alarm triggers. Maximize total money. Classic DP: **at each house, choose to rob or skip.**

■ Core Intuition

At house i , you have two choices: **rob it** (take $\text{nums}[i] + \text{best_from_}i-2$) or **skip it** (take $\text{best_from_}i-1$). Take the max. $\text{dp}[i] = \max(\text{dp}[i-1], \text{dp}[i-2] + \text{nums}[i])$

■ DP Table — [2,7,9,3,1]

```
nums: [2, 7, 9, 3, 1]
idx:   0  1  2  3  4
dp[0] = 2           (only house 0)
dp[1] = max(2,7) = 7 (best of house 0 or house 1)
dp[2] = max(dp[1], dp[0]+nums[2]) = max(7, 2+9) = 11
dp[3] = max(dp[2], dp[1]+nums[3]) = max(11, 7+3) = 11
dp[4] = max(dp[3], dp[2]+nums[4]) = max(11, 11+1) = 12
★ ANSWER = 12 (rob houses 0,2,4: 2+9+1=12)
```

■ Code

```
public int rob(int[] nums) {
    if (nums.length == 1) return nums[0];
    int prev2 = nums[0];
    int prev1 = Math.max(nums[0], nums[1]);
    for (int i = 2; i < nums.length; i++) {
        int curr = Math.max(prev1, prev2 + nums[i]);
        prev2 = prev1;
        prev1 = curr;
    }
    return prev1;
}
```

■ TIME

$O(n)$

■ SPACE

$O(1)$

■ Common Mistakes

■ Off-by-one in initialization

$dp[1] = \max(nums[0], nums[1])$ — NOT $nums[1]$. You can choose to skip house 1 and keep house 0.

■ Practice

#	Problem	Diff	Pattern
1	House Robber (LC 198)	Medium	Linear DP
2	House Robber II (LC 213)	Medium	Circular DP
3	House Robber III (LC 337)	Medium	Tree DP
4	Delete and Earn (LC 740)	Medium	House Robber variant
5	Max Sum of Non-Adjacent Elements	Medium	Linear DP

- ✓ $dp[i] = \max(dp[i-1], dp[i-2] + nums[i])$
- ✓ Choice: rob current (skip prev) OR skip current (keep prev best)
- ✓ Base: $dp[0]=nums[0]$, $dp[1]=\max(nums[0], nums[1])$
- ✓ Space optimize to two variables
- ✓ Time: $O(n)$ | Space: $O(1)$

■ MENTAL MODEL — Remember This Forever

At every house you face a binary choice: TAKE IT or LEAVE IT. Taking means you skipped the previous. Leaving means you carry forward the best so far. The DP table is just tracking the best you could have done up to each house — greedily, but with memory.