🧠 1D Dynamic Programming Problems with Their Recurrence Relations

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1️⃣ Fibonacci Numbers

$$dp[i] = dp[i-1] + dp[i-2]$$

2️⃣ Climbing Stairs

$$dp[i] = dp[i-1] + dp[i-2]$$

3️⃣ Minimum Cost Climbing Stairs

$$dp[i] = \min(dp[i-1] + cost[i-1], dp[i-2] + cost[i-2])$$

4️⃣ House Robber

$$dp[i] = \max(dp[i-1], nums[i] + dp[i-2])$$

5️⃣ Frog Jump

$$dp[i] = \min(dp[i-1] + |h[i] - h[i-1]|, dp[i-2] + |h[i] - h[i-2]|)$$

6️⃣ Maximum Sum of Non-Adjacent Elements

$$dp[i] = \max(dp[i-1], nums[i] + dp[i-2])$$

7️⃣ Maximum Subarray Sum (Kadane's Algorithm)

$$dp[i] = \max(nums[i], nums[i] + dp[i-1])$$

8️⃣ Paint Fence Problem

$$dp[i] = (dp[i-1] + dp[i-2]) \times (k-1)$$

9️⃣ Decode Ways

$$dp[i] = (valid1?\, dp[i-1] : 0) + (valid2?\, dp[i-2] : 0)$$

🔟 Jump Game (Minimum Jumps to Reach End)

$$dp[i] = 1 + \min_{0 \le j < i,\ j + arr[j] \ge i} (dp[j])$$