Lab 7

Problem 1

A frog starts at cell 1 and wants to reach cell n. It can jump either 1 or 2 cells forward in a single move. Each cell i has a non-negative integer cost $c[i]$. Find the **number of different paths with minimum total cost** from cell 1 to cell n.

Input: An array $c[1..n]$, where $c[i]$ is the cost of cell i.

Output: The number of different paths that achieve the minimum total cost.

Input: 1 1 2 1 3

Output: 2

Explanation: The minimum cost is $1 \to 3 \to 5$ and $1 \to 2 \to 4 \to 5$.

Problem 2

A frog again jumps from cell 1 to n by jumping 1 or 2 cells forward. Each cell i contains a lowercase letter $s[i]$. As the grasshopper lands on cells, it reads the letters sequentially. Find the path that produces the **lexicographically smallest string**.

Input: A string s of length n, where $s[i]$ is the letter on cell i.

Output: The lexicographically smallest string that can be formed.

Input: bacd

Output: bad

Explanation: The path $1 \to 2 \to 4$ forms the string "bad", which is the smallest possible.

Problem 3

A Rabbit starts with the number 1 and wants to obtain the number n. He can apply the following operations any number of times:

1. Add 1
2. Multiply by 2
3. Multiply by 3

Find the **minimum number of operations** required to reach n from 1.

Input: An integer n.

Output: The minimum number of operations.

Input: 10

Output: 3

Explanation: One possible sequence is $1 \to 3 \to 9 \to 10$.

Problem 4

An elephant moves from cell $(1, 1)$ to (n, m), moving only one cell to the right or one cell down. Each cell (i, j) contains $B[i][j]$ bananas. The elephant collects bananas from every cell it visits. Find the **maximum number of bananas** the elephant can collect.

Problem 5

An elephant moves from cell $(1, 1)$ to (n, m), moving only one cell to the right or one cell down. Each cell (i, j) contains $B[i][j]$ bananas. The elephant collects bananas from every cell it visits. Find the **maximum odd number** of bananas that can be collected.

Problem 6

A person has a list of work scheduled over n days, numbered from 1 to n. If the person works on day i, he earns a profit $P[i]$ for that day. However, the person cannot work on two consecutive days (i.e., he cannot work on both day i and day $i + 1$). Your task is to determine the **maximum total profit** the person can earn under this constraint.

Input The first line contains an integer n — the number of days. The second line contains n integers $P[1], P[2], \ldots, P[n]$ — the profit earned if the person works on day i.

Output Print a single integer — the maximum profit the person can earn without working on two consecutive days.

Input: 5

5 1 2 10 6 Output: 15