Coin Change Problem

The coin change problem is a classic example of a dynamic programming problem in computer science. The task is to find the number of ways to make a given amount using a set of coin denominations, where each coin can be used unlimited times.

Description

Given a set of coin denominations and a target amount, determine the number of ways to make the target amount using the given coin denominations. This problem can be solved using dynamic programming, where we build a table to keep track of the number of ways to make each amount from 0 to the target amount.

The problem is a common interview question and is widely used to teach the concepts of dynamic programming, combinatorial problems, and optimization techniques.

For example, if you have coin denominations of 1, 2, and 3, and you need to make the amount 4, there are four possible ways to do so:

1. 1+1+1+1
2. 1+1+2
3. 2+2
4. 1+3

The solution involves building a table where the rows represent amounts from 0 to the target amount, and the columns represent the different coin denominations. Each cell in the table contains the number of ways to make the corresponding amount using the available denominations up to that point.

This problem is often used to teach and practice dynamic programming techniques due to its clear structure and practical applications in financial transactions, resource allocation, and optimization problems.

Problem

Given a set of coin denominations and a target amount, you need to determine the number of ways to make the target amount using the given coin denominations. Each coin denomination can be used an unlimited number of times.

Function Description

Complete the function `‘count_ways’` in the editor below.

`‘count_ways’` has the following parameters:

- `‘list of integers denominations’`: the list of coin denominations available.
- `‘int target_amount’`: the target amount you need to form using the given denominations.

The function should return an integer representing the number of ways to form the `‘target_amount’` using the given coin denominations.

Constraints

- $1 \leq \text{target\_amount} \leq 10^3$
- $1 \leq \text{denominations}[i] \leq 50$
- $1 \leq \text{len(denominations)} \leq 50$

Input Format

The first line contains an integer, *n*, the number of coin denominations.

The second line contains space-separated integers, representing the coin denominations.

The third line contains an integer, the target amount.

Output Format

Return an integer representing the number of ways to form the target amount using the given coin denominations.

Example

Input
3 1 2 3 4

Output
4

Explanation

There are four ways to make 4 using denominations [1, 2, 3]:

5. 1+1+1+1
6. 1+1+2
7. 2+2
8. 1+3