1 Maximum Amount of Gold

Problem Introduction

You are given a set of bars of gold and your goal is to take as much gold as possible into your bag. There is just one copy of each bar and for each bar you can either take it or not (hence you cannot take a fraction of a bar).

Problem Description

Task. Given n gold bars, find the maximum weight of gold that fits into a bag of capacity W.

Input Format. The first line of the input contains the capacity W of a knapsack and the number n of bars of gold. The next line contains n integers $w_0, w_1, \ldots, w_{n-1}$ defining the weights of the bars of gold.

Constraints. $1 \leq W \leq 10^4$; $1 \leq n \leq 300$; $0 \leq w_0, \ldots, w_{n-1} \leq 10^5$.

Output Format. Output the maximum weight of gold that fits into a knapsack of capacity W.

Sample 1.

Input:

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10 3
1 4 8
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Output:

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9
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Here, the sum of the weights of the first and the last bar is equal to 9.

Starter Files

Starter files contain an implementation of the following greedy strategy: scan the list of given bars of gold and add the current bar if it fits into the current capacity (note that, in this problem, all the items have the same value per unit of weight, for a simple reasons: they are all made of gold). As you already know from the lectures, such a greedy move is not safe. You may want to additionally submit a starter file as a solution to the grading system to ensure that this greedy algorithm indeed might produce a non-optimal result.

Need Help?

Ask a question or see the questions asked by other learners at this forum thread.