Additional DP questions (hard)

The knapsack problem

Question

You have three items that you can put into the knapsack that can hold 4lbs. Stereo $3000 4lbs, Laptop $2000 3lbs, and Guitar $1500 1lbs. What items should you steal so that you steal the maximum money's worth of goods?

- Input: value = [3000, 2000, 1500], weight = [4, 3, 1], W = 4
- Output: 3500
- Explanation: Laptop ($2000) and Guitar ($1500) as they worth $3500.

Minimum Difficulty of a Job Schedule

Question

You want to schedule a list of jobs in d days. Jobs are dependent (i.e To work on the ith job, you have to finish all the jobs j where 0 <= j < i).

You have to finish at least one task every day. The difficulty of a job schedule is the sum of difficulties of each day of the d days. The difficulty of a day is the maximum difficulty of a job done on that day.

You are given an integer array jobDifficulty and an integer d. The difficulty of the ith job is jobDifficulty[i]. Return the minimum difficulty of a job schedule. If you cannot find a schedule for the jobs return -1.

- Input: jobDifficulty = [6,5,4,3,2,1], d = 2
- Output: 7
- Explanation: First day you can finish the first 5 jobs, total difficulty = 6. Second day you can finish the last job, total difficulty = 1. The difficulty of the schedule = 6 + 1 = 7

Split Array Largest Sum

Question

Given an array nums which consists of non-negative integers and an integer m, you can split the array into m non-empty continuous subarrays.

Write an algorithm to minimize the largest sum among these m subarrays.

- Input: nums = [7,2,5,10,8], m = 2
- Output: 18
- Explanation: There are four ways to split nums into two subarrays. The best way is to split it into [7,2,5] and [10,8], where the largest sum among the two subarrays is only 18.