1. Coin Change

Given a value V, if we want to make a change for V Rs, and we have an infinite supply of each of the denominations in Indian currency, i.e., we have an infinite supply of {1, 2, 5, 10, 20, 50, 100, 500, 1000} valued coins/notes, what is the minimum number of coins and/or notes needed to make the change?

Examples:

Input: V = 70

Output: 2

We need a 50 Rs note and a 20 Rs note.

Input: V = 121

Output: 3

We need a 100 Rs note, a 20 Rs note and a 1 Rs coin.

2. Fractional Knapsack

Given the weights and values of n items, we need to put these items in a knapsack of capacity W to get the maximum total value in the knapsack.

Example:

Input:

Items as (value, weight) pairs

arr[] = {{60, 10}, {100, 20}, {120, 30}}

Knapsack Capacity, W = 50;

Output:

Maximum possible value = 240

by taking items of weight 10 and 20 kg and 2/3 fraction

of 30 kg. Hence total price will be 60+100+(2/3)(120) = 240

3. Activity Selection Problem

Given a set of activities, along with the starting and finishing time of each activity, find the maximum number of activities performed by a single person assuming that a person can only work on a single activity at a time.

Example:

Input:

3,7

2,4

5,8

6,9

1,11

10,12

0,3

Output: 3

4. Job Sequencing Problem

Given an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline. It is also given that every job takes the single unit of time, so the minimum possible deadline for any job is 1. How to maximize total profit if only one job can be scheduled at a time.

Examples:

Input: Four Jobs with following deadlines and profits

JobID Deadline Profit

a 4 20

b 1 10

c 1 40

d 1 30

Output: Following is maximum profit sequence of jobs

c, a

Input: Five Jobs with following deadlines and profits

JobID Deadline Profit

a 2 100

b 1 19

c 2 27

d 1 25

e 3 15

Output: Following is maximum profit sequence of jobs

c, a, e

5. Job Sequencing Problem – Loss Minimization

We are given N jobs numbered 1 to N. For each activity, let Ti denote the number of days required to complete the job. For each day of delay before starting to work for job i, a loss of Li is incurred.

We are required to find a sequence to complete the jobs so that overall loss is minimized. We can only work on one job at a time.

Examples:

Input: L = {3, 1, 2, 4} and

T = {4, 1000, 2, 5}

Output : 3, 4, 1, 2

Explanation: We should first complete Job 3, then jobs 4, 1, 2 respectively.

Input : L = {1, 2, 3, 5, 6}

T = {2, 4, 1, 3, 2}

Output : 3, 5, 4, 1, 2

Explanation: We should complete jobs 3, 5, 4, 1 and then 2 in this order.

6. Platform

Given arrival and departure times of all trains that reach a railway station, the task is to find the minimum number of platforms required for the railway station so that no train waits. We are given two arrays which represent arrival and departure times of trains that stop.

Examples:

Input: arr[] = {9:00, 9:40, 9:50, 11:00, 15:00, 18:00}

dep[] = {9:10, 12:00, 11:20, 11:30, 19:00, 20:00}

Output: 3

Explanation: There are at-most three trains at a time (time between 11:00 to 11:20)

Input: arr[] = {9:00, 9:40}

dep[] = {9:10, 12:00}

Output: 1

Explanation: Only one platform is needed.

7. Power

Given two integers x and n, write a function to compute x^n. We may assume that x and n are small and overflow doesn't happen.

Examples :

Input : x = 2, n = 3

Output : 8

Input : x = 7, n = 2

Output : 49

10. Mice to Hole

There are N Mice and N holes are placed in a straight line. Each hole can accommodate only 1 mouse. A mouse can stay at his position, move one step right from x to x + 1, or move one step left from x to x -1. Any of these moves consumes 1 minute. Assign mice to holes so that the time when the last mouse gets inside a hole is minimized.

<u>Examples:</u>

Input: positions of mice are:

    4 -4 2

  positions of holes are:

    4 0 5

Output: 4

Assign mouse at position x = 4 to hole at

position x = 4 : Time taken is 0 minutes

Assign mouse at position x=-4 to hole at

position x = 0 : Time taken is 4 minutes

Assign mouse at position x=2 to hole at

position x = 5 : Time taken is 3 minutes
After 4 minutes all of the mice are in the holes.
Since, there is no combination possible where
the last mouse's time is less than 4,
answer = 4.

Input: positions of mice are:
-10, -79, -79, 67, 93, -85, -28, -94
positions of holes are:
-2, 9, 69, 25, -31, 23, 50, 78
Output: 102

11. Minimize the sum of Product

Minimize the sum of Product: You are given two arrays, A and B, of equal size N. The task is to find the minimum value of A[0] * B[0] + A[1] * B[1] +...+ A[N-1] * B[N-1], where shuffling of elements of arrays A and B is allowed.

Example:

Input:

N = 3

A[] = {3, 1, 1}

B[] = {6, 5, 4}

Output:

23

Explanation:

1*6+1*5+3*4 = 6+5+12

= 23 is the minimum sum