Walchand College of Engineering, Sangli
Computer Science & Engineering
Third Year

Course: Computer Algorithm Lab

Week 2 and 3 Assignment

Searching Algorithm

Q.1 You are an IT company's manager. Based on their performance over the last N working days, you must rate your employee. You are given an array of N integers called workload, where workload[i] represents the number of hours an employee worked on an i^{th} day. The employee must be evaluated using the following criteria:

- Rating = the maximum number of consecutive working days when the employee has worked more than 6 hours.

You are given an integer *N* where *N* represents the number of working days. You are given an integer array *workload* where *workload[i]* represents the number of hours an employee worked on an i^{th} day.

Task

Determine the employee rating.

Q.2 You have N boxes numbered 1 through N and K candies numbered 1 through K. You put the candies in the boxes in the following order:

- first candy in the first box,
- second candy in the second box,
- .....
- .....
- so up to N-th candy in the Nth box,
- the next candy in (N - 1)-th box,
- the next candy in (N - 2)-th box
- .....
- .....
- and so on up to the first box,
- then the next candy in the second box
- ..... and so on until there is no candy left.

So you put the candies in the boxes in the following order:

Find the index of the box where you put the K-th candy.

Q.3 Implement and Explain Tower of Hanoi algorithm.

Q.4

There is a frog initially placed at the origin of the coordinate plane. In exactly 1 second, the frog can either move up 1 unit, move right 1 unit, or stay still. In other words, from position (x, y), the frog can spend 1 second to move to:

- $(x+1, y)$
- $(x, y+1)$
- (x, y)

After T seconds, a villager who sees the frog reports that the frog lies on or inside a square of side-length s with coordinates (X, Y), $(X+s, Y)$, $(X, Y+s)$, $(X+s, Y+s)$. Calculate how many points with integer coordinates on or inside this square could be the frog's position after exactly T seconds

Input Format:

The first and only line of input contains four space-separated integers: X, Y, s, and T.

Output Format:

Print the number of points with integer coordinates that could be the frog's position after T seconds.

Q. 5 **Lost Package Tracker**

Problem Statement:

A logistics company stores the scanned timestamps (in hours) of packages entering a warehouse in an array timestamps[]. Sometimes, a timestamp is repeated due to re-scanning.

A package is considered "lost" if its ID (timestamp) is missing between two valid timestamps.

Task:

Given a sorted but incomplete list of timestamps from start to end, find the first missing timestamp in the range.

Input: timestamps = [1001, 1002, 1004, 1005]

Output: 1003

Q.6 Implement linear search algorithm.

Q.7 Implement Binary Search algorithm.

Q.8 **Signal Drop Detector**

Problem Statement:

You're monitoring signal strengths over time using an array signal[]. A drop is defined as a strictly decreasing subsequence for at least 3 consecutive readings.

Task:

Find the number of such "signal drops" in the array.

Input: signal = [5, 4, 3, 6, 7, 4, 3, 2]

Output: 2 (drops: 5→4→3 and 7→4→3→2)