United International University
Department of Computer Science and Engineering
Course Title: Data Structure and Algorithm II
Semester: Fall 2024

Lab Tasks:

Task 1:

You are given an integer **N**. Your task is to print numbers from 1 to N first, then N to 1(in reverse order) using recursion.

Input: N = 5	***Output:*** *1 2 3 4 5* *5 4 3 2 1*
Input: *N = 10*	***Output:*** *1 2 3 4 5 6 7 8 9 10* *10 9 8 7 6 5 4 3 2 1*

Task 2: Help Iron Man Decode the Binary Arc Reactor Core

Tony Stark, the genius billionaire inventor, is working on a secret upgrade for his Iron Man suit. The Arc Reactor at the heart of his suit has a new feature—it requires all numeric inputs to be converted into binary to optimize energy flow. Unfortunately, J.A.R.V.I.S. is busy analyzing alien technology, and Tony needs your help to write a program that converts numbers from decimal to binary.
Your Task is
“Given a decimal number as input, we need to write a program to convert the given decimal number into an equivalent binary number. “

Example:

Input : 7
Output :111

Input :10
Output :1010

Task 3: Thor's Hammer Energy Amplification

Thor is preparing for his next battle against cosmic threats. His hammer, Mjölnir, can amplify its energy output by harnessing the power of magical elements. These elements are represented as an array of integers, and the energy amplification is the product of all the element values.

Unfortunately, Thor's calculations were disrupted by Loki's tricks, and he now needs your help to create a recursive program that computes the total energy amplification from an array of magical elements.

Your task is to write a recursive function to find the product of all elements in the array.

Example:

Input: n = 4 elements = [2, 3, 5, 7]	Output: 210

Task 4: Captain America's Shield Integrity Check

During an intense battle, Captain America's shield takes several hits. Each impact is measured and recorded in an array, where each number represents the strength of a hit. To assess the shield's integrity, Captain needs to find the weakest and strongest hits from the recorded data.

Your mission is to write a program that uses recursion to determine the minimum and maximum values from the array of hits

Input: `arr = {1, 4, 3, -5, -4, 8, 6};`	Output: Min: -5 Max: 8

Task 5: Is this a Palindrome?

Write a recursive program to check if a given string is a palindrome or not (not case sensitive, ignore whitespaces)

Sample input	**Sample output**
Evil olive	True
Too bad	False

Task 6: Finding clues among consonants!

Loki has left a secret message encoded in a string. He has hidden its true meaning behind the consonants in the message. Thor has discovered that the total number of consonants in the string holds the key to unlocking its mystery. Your task is, Given a string, find the total number of consonants (vowels: a,e,i,o,u)

NB: Try to find the total number of unique consonants. That means pass the array by removing the duplicates first!

Input:	Output:
"Loki is a trickster!"	10