Assignment 2

Submission Instruction:

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Subject Line: A2_ROLLNO
Attachments: A2_ROLLNO_P1.c/.cpp
A2_ROLLNO_P2.c/.cpp
A2_ROLLNO_P3.c/.cpp

Deadline: 18-Jan-2024   11:59 P.M.

Problem 1

- Given an array of n ($1 \leq n \leq 1000$) integers (not necessarily unique), write a C program that considers each integer in the array one-by-one, and inserts them in a linked list in non-descending order, and print the linked list. Write a C code to remove duplicates from the linked list, and print the resulting list. Given an integer k, write a C code to reverse every k integers in the linked list, and print the k-reversed list.

- **Input**: n = 10 A[] = {8, 7, 1, 1, 8, 9, 6, 3, 2, 4} k = 3

- **Output**:

- Sorted List with duplicates: 1 1 2 3 4 6 7 8 8 9

- Sorted List with no duplicates: 1 2 3 4 6 7 8 9

- 3-Reversed List: 3 2 1 7 6 4 9 8

Problem 2

A string s is lexicographically sorted if for all valid i, s[i] is the same as or comes before s[i+1] in the alphabet. Given an integer n ($1 \leq n \leq 30$), print the number of strings of length n that consist only of vowels (a, e, i, o, u) and are lexicographically sorted. You do not need to print the strings, print the count only.

Input: n = 1
Output: 5 ("a", "e", "i", "o", "u")

Input: n = 2
Output: 15 ("aa", "ae", "ai", "ao", "au", "ee", "ie", "oe", "ue", "ii", "io", "iu", "oo", "ou", "uu"))

Problem 3

- Given a tree of n ($1 \leq n \leq 1000$) nodes labelled from 0 to n - 1, and an array of n - 1 edges where an edge {a, b} indicates that there is an undirected edge between the two nodes a and b in the tree. Note that any node of the tree can act as a root.

- The height of a rooted tree is the number of edges on the longest path between the root and a leaf. When you select a node x as the root, the resultant tree has height h(x). Among all possible rooted trees, those with the minimum height are called minimum height trees (MHTs). Print the roots of all MHTs.

Constraints & Input-Output

Constraints:
- 1 <= n <= 20000
- 0 <= a, b < n
- a != b
- All the pairs {a, b} are distinct.
- The given input is guaranteed to be a tree.

Input: n = 4
{1,0},{1,2},{1,3}

Output: {1}

Input: n = 6
{3,0},{3,1},{3,2},{3,4},{5,4}

Output: {3,4}