CS2092D: Programming Laboratory
Extra Questions on Assignment 1 Part B

General Instructions
- Programs should be written in C language and compiled using C compiler in Linux platform.
- Invalid input should be detected and suitable error messages should be generated.
- Sample inputs are just indicative.
- The extra questions do not come under the purview of evaluation scheme.

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Part – B: Arrays
1. Write a program that reads an array of 'n' elements containing only 0's and 1's. Your program should find the position of a 0 and replace it with a 1 to get the longest continuous sequence of 1's. Let this position of 0 be called as p. Print p if such a 0 exists and print -1 if the original array contains only 1's. Assume the array indexing starts from 0.

   > Input: Number of elements in the array: 13
   >   Elements: 1, 1, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1
   > Output: Position 9
   > Input: Number of elements in the array :5
   >   Elements: 1, 1, 1, 1, 0
   > Output: Position 4

2. Write a program that finds an element x in the array of integers that partitions the array into two sub-arrays (excluding x) having equal product (i.e. the product of elements in the two sub-arrays should be equal). Print x and its position in the array if such a partition is possible. Print '*Impossible Partition*' if no such partition is possible. Assume the array indexing starts from 0.

   > Input: Number of elements in the array: 5
   >   Enter the elements: 1 4 2 1 4
   > Output: Array element is 2 and it's position is at 2.
   >   Subarrays: {1, 4} and {1, 4}
   >
   > Input: Number of elements in the array: 6
   >   Enter the elements: 2, 3, 4, 1, 4, 6
   > Output: Array element is 1 and it's position is at 3.

Input: Number of elements in the array: 3
      Enter the elements: 1, 2, 3
Output: Impossible Partition

3. Given an integer array of size 'n' and a positive integer 'm', write a program to find the number of subsets (all combinations of elements in the array) such that the sum of the elements in the subset is divisible by 'm'. Print the subsets of the original array and print the subsets which are divisible by m.
    Input: Enter the size of the array: 3
      Enter the elements of the array: 1, 2, 3
      Enter the value of m: 3
    Output: Subsets of the given array are
      {}, {1}, {2}, {3}, {1, 2}, {2, 3}, {1, 3} and {1, 2, 3}.
      Subsets whose sum is divisible by 3 are: {3}, {1, 2}, {1, 2, 3}

    Input: Enter the size of the array: 3
      Enter the elements of the array: 1, 2, 3
      Enter the value of m: 7
    Output: Subsets of the given array are
      {}, {1}, {2}, {3}, {1, 2}, {2, 3}, {1, 3} and {1, 2, 3}.
      Subsets whose sum is divisible by 7 are: NIL

4. Write a program that prints the kth largest element of the array of 'n' integers.
    Input: Enter the size of the array: 4
      Enter the elements of the array: 5, 3, 6, 11
      Enter the value of k: 2
    Output: The 2nd largest element of the given array is 6.

5. Given two integer arrays of equal size, write a program to find all pairs of elements (select any two elements) in the first array whose sum is present in the second array. Print "No such pairs are present" if no such pair exists.
    Input: Enter the size of the arrays: 4
      Enter the elements of first array   : 1, 5, 10, 8
      Enter the elements of second array : 2, 15, 13, 1
    Output: The pairs are (5, 10), (8, 5)

    Input: Enter the size of the arrays: 4
      Enter the elements of first array   : 1, 5, 10, 8
      Enter the elements of second array : 2, 3, 12, 16
    Output: No such pairs are present

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