PSCP Assignment-4 (Section-C)

Due Date: 07/02/2021

1. A list of numbers 'L' is said to be strictly increasing if L[i] < L[i+1]; L is said to be strictly decreasing if L[i] > L[i+1]. A list is called perfect if it is first strictly increasing, then constant and finally strictly decreasing.
   Write a C++ function that takes 20 non-negative integer array from the user as parameter and check whether the list of numbers is perfect or not.

2. Write a C++ function which reads a sequence of positive integers till the user types −1. It counts the lengths of the non-decreasing subsequences, and prints the maximum among them. For example, for input {6, 7, 2, 29, 17, 5, 5, 11, 6, 7, 8, −1} the non-decreasing subsequences are: {6, 7}, {2, 29}, {17}, {5, 5, 11} and {6, 7, 8}. Thus the answer should be 3. Assume that the first integer read is not −1 and a single integer is a sequence of length 1.
3. Write a C++ program to sort a given array of integer numbers and also provide a function to search for a given element in that sorted array using binary search algorithm.

4. A way to calculate the value of π is based on the use of a series defines as follows (N-number of terms). Write a function to find π value (up to n terms and display the result by correcting it to three decimal places):

$$\pi = 4\sum_{i=0}^{n}(-1)^i/(2i+1)$$

5. Given 3-angles as parameters, Write a function to check whether they form a triangle or not (A+B+C =180). If yes check whether triangle is scalen, equilateral, isoceless or right angled triangle.

6. A user enters integers until end of input and wants to find the largest number in the list of integers entered and the number of times it was entered. For example, if the input is 5, 2, 15, 3, 7, 15, 8, 9, 5, 2, 15, 3, and 7, the largest is 15 and is repeated 3 times. Write a program to compute frequency of the largest of the integers entered without storing them. Write a function that displays the integers read and returns the largest number and its frequency.

7. Write a C++ function to receive values of latitude(L1,L2) and longitude (G1,G2), in degrees, of two places on the earth and output the distance(D) between then in nautical miles.
8. Write a program that contains function that accepts as argument an array A of integers together with its size n and a non-negative integer k. The function should return another

array, allocated within the function, which is obtained by cyclically shifting the input array A by k positions to the right. For example, upon the input of A = {2, 4, 6, 1, 3, 9, 5} of size n = 7 and k = 3, your function should return {3, 9, 5, 2, 4, 6, 1}.

9. Let A and B be two arrays. Write a function to create a new array C that contains elements alternately from A and B beginning with the first element of A If you run out of elements in one of the lists (arrays), then append the remaining elements of the other list (array) to C and display C.

10. Write a program that computes the area of an arbitrary triangle where a, b, and c are the lengths of the sides. The program should call a function that takes three parameters (such as, a, b and c) as inputs and returns the area of the triangle to the main () function. Note that not all the combinations of a, b, and c produce a triangle. Your function (user defined) should produce correct results for legal data and reasonable results for illegal combinations of a, b and c.