Practice Problem 5 – (Theme: Templates)

5.1

Write a program to implement a class called **difference**. The difference class will measure the distance between two elements which can be datatype instances or objects.

The structure of the class can be as follows (but not limited to this alone)

```
template <class T>
class Difference{
      T first;
      T second;
    public:
      Difference(){.....}
      Difference(....){.....}
      <returntype> reset(...){.....}
      <returntype> distance(...){.....}
      .....
};
```

Bind the template with different datatypes such as int, float, char, string, complex number.
distance between two chars is the difference in their ASCII code, distance between two strings is TUC-CC where TUC is the Total number of Unique Char in first and second strings together and CC is the Total number of common char in first and second. Ex: distance("one","two")=5-1=4

5.2

Write a program to implement a template derived class named **AccountStatus**. The AccountStatus class should derive from another template based class called **Account** and the above class called Difference. The Account class will have the account information of an account holder such as Name, Address, age and balance. The AccountStatus class will maintain the status of an account. It should have at least four private data members.

1. minBalance: minimum permitted balance (it should be a constant int)
2. status: 1 if balance is greater than minBalance, 0 if lesser than minBalance
3. relativeGreater: Number of accounts whose balance is lesser than its own
4. relativeLeser: Number of accounts whose balance is greater than its own

You should used the distance function that is inherited from Difference class.

You can implement the account management in two ways (you can implement either one of them or both).

1. You can create a separate AccountManager Class which can have an array accounts as private member and provide the supporting functions such as insert an account, delete an account or update an account, search an account.
2. Or, instantiate an array of accounts in the main and provide the above supporting functions such as insert an account, delete an account or update an account, search an account.

Input: enter a list of account holder's information

output: search an account and display its status, balance, relativeGreater and relativeLeser.

Practice Problem 6 – (Theme: Virtual Function)

6.1

Define an abstract class called Shape and define a pure virtual function named area. Now, define another three classes namely line, triangle and rectangle. These three classes should inherit from the Shape class. Implement the virtual function such that it estimates the area of the shape i.e., the length of a line, area of a triangle and area of a rectangle.

6.2

Use the above Difference class (Problem 5.1) and define the distance function as pure virtual. Define another template class called DistanceManager which inherits from Difference class and define the distance function. The distance function should measure the distance between two objects i.e., difference between the length of two lines, difference between the area of two triangles, difference between the area of two rectangles. You should use the same classes defined in problem 6.1 for line, triangle and rectangle.

Practice Problem 7 – (Theme: Non-type Templates)
The distance function define above is a member function of a class. Instead define it as an independent function (outside a class). Now, rewrite the Problem 6.2 as follow:

1. Define a nontype template class called Difference.
2. Bind the address of the distance function with the nontype template.
3. Measure the distance between two objects i.e., difference between the length of two lines, difference between the area of two triangles, difference between the area of two rectangles.

Practice Problem 8 – (Theme: Friend and static)
Redefine the Problem 5.1. Use the same class structure and problem statement as it is. However, redefine the function distance as

1. static function member
2. friend function member.