

**Assignment 01**

**Object Oriented Programming, Spring 2023**

**BSIT-2A/B, BSIOT/CB**

**Department of Computer Science,**

**Faculty of Computer Science & Information Technology,**

**The Superior University Gold Campus, Lahore.**

**Submission Deadline: Monday, May 15, 2023**

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*Note: Keep all your code files. It will be required at any time of evaluation.*

**Question 01: (10 Points)**

Imagine a tollbooth at a bridge. Cars passing by the booth are expected to pay a 50 cent toll. Mostly they do, but sometimes a car goes by without paying. The tollbooth keeps track of the number of cars that have gone by, and of the total amount of money collected. Model this tollbooth with a class called tollBooth. The two data items are a type unsigned int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both of these to 0. A member function called payingCar() increments the car total and adds 0.50 to the cash total. Another function, called nopayCar(), increments the car total but adds nothing to the cash total. Finally, a member function called display() displays the two totals. Make appropriate member functions const. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the Esc key should cause the program to print out the total cars and total cash and then exit.

**Question 02: (10 Points)**

Write a program that converts a number entered in Roman numerals to a decimal. Your program should consist of a class, say, romanType. An object of type romanType should do the following:

1. Store the number as a Roman numeral.
2. Convert and store the number into decimal form.
3. Print the number as a Roman numeral or decimal number as requested by the user.

The decimal values of the Roman numerals are:

M 1000

D 500

C 100

L 50

X 10

V 5

I 1

1. Test your program using the following Roman numerals: MCXIV, CCCLIX, MDCLXVI

**Question 03: (10 Points)**

Design and implement a class dayType that implements the day of the week in a program. The class dayType should store the day, such as Sun for Sunday. The program should be able to perform the following operations on an object of type dayType:

1. Set the day.
2. Print the day.
3. Return the day.
4. Return the next day.
5. Return the previous day.
6. Calculate and return the day by adding certain days to the current day. For example, if the current day is Monday and we add 4 days, the day to be returned is Friday. Similarly, if today is Tuesday and we add 13 days, the day to be returned is Monday.
7. Add the appropriate constructors.

**Question 04: (10 Points)**

(Tic-Tac-Toe) Write a program that allows two players to play the tic-tac-toe game. Your program must contain the class ticTacToe to implement a ticTacToe object. Include a 3-by-3 two-dimensional array, as a private member variable, to create the board. If needed, include additional member variables. Some of the operations on a ticTacToe object are printing the current board, getting a move, checking if a move is valid, and determining the winner after each move. Add additional operations as needed.

**Question 05: (10 Points)**

Define the class bankAccount to implement the basic properties of a bank account. An object of this class should store the following data: Account holder’s name (string), account number (int), account type (string, checking/saving), balance (double), and interest rate (double). (Store interest rate as a decimal number.) Add appropriate member functions to manipulate an object. Use a static member in the class to automatically assign account numbers. Also declare an array of 10 components of type bankAccount to process up to 10 customers and write a program to illustrate how to use your class.

**Question 06: (10 Points)**

Make a Circle class.

1. It has three attributes radius, the x and the y coordinates of its center.
2. Make a no argument constructor to initialize it’s attributes to 0, and a three argument constructor to initialize with the fixed values given by user.
3. Make void setValues(float, float, float) functions to set x, y and radius.
4. Make float area() function, and a float circumference() function to return area and circumference.
5. Make void print() function to display x , y coordinates and radius of a circle.

Call these functions in main() to test their working.

**Question 07: (10 Points)**

Create a class **Rectangle** with attributes **length** and **width**

1. Make a no argument constructor to initialize attributes to 1
2. Also make a two argument constructor.
3. Make member functions that calculate and return the perimeter and the area of the rectangle.
4. Also, provide void **set( int l, int w)** and **void get()** functions for the length and width attributes.
5. Make a Draw function that draws a rectangle using a character \* on console.

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**Question 08: (10 Points)**

**Create a class called time that has separate int member data for hours, minutes, and seconds.**

1. One constructor should initialize this data to 0, and another constructor should initialize it to fixed values.
2. Make **void print()** to display time in 23:59:59 format.
3. Make **void setHour(int)** to set hours.
4. Make **void setminute(int)** to set minutes.
5. Make **void setSecond(int)** to set seconds.
6. Make **void setTime(int,int,int)** to set hour, minute, second
7. Make **int Hour(); int Minute(); int Second();** to return hours, minute and seconds respectively.
8. Include a **tick()** member function that increments the time stored in a Time object by one second.
9. An add member function that should add two objects of type time passed as arguments.
10. Be sure to test the following cases:
    * Incrementing into the next minute.
    * Incrementing into the next hour.
    * Incrementing into the next day (i.e., 23:59:59 to 00:00:00).

Make 1000 times loop in a main function. Call tick and print functions in that loop for an object. Also make two objects and add them to a third object and print their values.