University of Central Punjab

Object Oriented Programming

Assignment # 2

Start Date: 29-11-2022 **Section: C3** **Total Marks: 100**

Due Date: 06-12-2022 **Program:** BSCS

Instructions

1. Understanding of the problems is part of the assignments.
2. You will get Zero marks if found any type of cheating.

(Note: You are also required to provide appropriate overloaded operators where it is required)

Q#1: 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.

Q#2: The equation of a line in standard form is $ax + by = c$, where in both a and b cannot be zero, and a, b, and c are real numbers. If $b \neq 0$, then $-a/b$ is the slope of the line. If $a = 0$, then it is a horizontal line, and if $b = 0$, then it is a vertical line. The slope of a vertical line is undefined. Two lines are parallel if they have the same slope or both are vertical lines. Two lines are perpendicular if either one of the lines is horizontal and the other is vertical or the product of their slopes is –1. Design the `class` **`lineType`** to store a line. To store a line, you need to store the values of a (coefficient of x), b (coefficient of y), and c. Your `class` must contain the following operations:

a. If a line is nonvertical, then determine its slope.
b. Determine if two lines are equal. (Two lines $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ are equal if either $a_1 = a_2$, $b_1 = b_2$, and $c_1 = c_2$ or $a_1 = ka_2$, $b_1 = kb_2$, and $c_1 = kc_2$ for some real number k.)

c. Determine if two lines are parallel.
d. Determine if two lines are perpendicular.
e. If two lines are not parallel, then find the point of intersection.

Add appropriate constructors to initialize variables of **lineType**. Also write a program to test your **class**.

Q#3: Defines the **class clockType** to implement time in a program. Add functions to this **class** so that a program that uses this **class** can set only the hours, minutes, or seconds and retrieve only the hours, minutes, or seconds. Make the functions that retrieve hours, minutes, and seconds as inline. Also write a program to test your **class**.

Q#3: 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**:

a. Set the day.
b. Print the day.
c. Return the day.
d. Return the next day.
e. Return the previous day.
f. 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.
g. Add the appropriate constructors.