Name: Md Jubair Pantho
Homework : 2
UTC ID: WZS444
Course: CPSC 5010

Problem 2.1:

Source code and Results:

```cpp
#include<iostream>

using namespace std;
/*
This program prompts the user to input the length of three edges of a triangle and returns the perimeter of the triangle
*/
int main(){

    //part 1: prompt the user to input the length of the three edges of a triangle
    double a, b, c;
    cout<< "Enter the length of the first side: ";
    cin>> a;

    cout<< "Enter the value of the second side: ";
    cin>> b;

    cout<< "Enter the value of the third side: ";
    cin>> c;
    //part 1.1: validate the input length the edges
    if(a > 0 && b > 0 && c > 0){
        cout<< "The length of the edges are valid" << endl;
    }
    else{
        cout<< "Edge length can't be zero or negative" << endl;
    }

    //part 2: calcaulate the peremeter and show the output
    if(a+b > c && b+c > a && a+c > b){
        double peremeter;
        peremeter = a+b+c;
        cout<<"The peremeter of the triangle is: " << peremeter << endl;
    }
    else{
        cout<< "The input is not valid: The sum of the lenth of any two pairs of the side must be greater than the other side" << endl;
    }

    return 0;
}
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```
Enter the value of the second side: 6
Enter the value of the third side: 8
The length of the edges are valid
The peremeter of the triangle is: 19
```

Please click on the link : Problem 2.1

Problem 2.2:
Source code and Results:

```cpp
#include<iostream>
#include<cmath>
using namespace std;
/*
This program prompts the user to input the center co-ordinates and the radius of two circles and decides
whether the second circle is inside the first circle or overlaps with the first one
*/
int main(){
    //part 1: prompt the user to enter the center co-ordinates and the radious of two circles
    double x1, y1, x2, y2, radius_1, radius_2;
    cout<< "Enter the x co-ordinate(x1) of the first circle: ";
    cin>> x1;
    cout<< "Enter the y co-ordinate(y1) of the first circle: ";
    cin>> y1;

    cout<< "Enter the x co-ordinate(x2) of the second circle: ";
    cin>> x2;
    cout<< "Enter the y co-ordinate(y2) of the second circle: ";
    cin>> y2;

    cout<< "Enter the radius of the first circle: ";
    cin>> radius_1;
    cout<< "Enter the radius of the second circle: ";
    cin>> radius_2;

    //part 1.1 : check whether the radius is correct input or not
    if(radius_1 > 0 && radius_2 > 0){
        cout << "Radius is valid." << endl;
    }
    else{
        cout<< "Radius is a lenth which can't be zero or negative, If the radius is zero then its a point not a circle" << endl;
    }

    //part 2: decide whether the second circle is inside the first one or not or overlaps each other
    double center_distance;
    //part 2.1 : center distance is found by using the formula to find the distance between two points
    center_distance = sqrt(pow((x2-x1), 2) + pow((y2-y1), 2));
    //part 2.2 : if the center distance is less than or equal than the absolute distances between the radious then circle_2 is inside circle_1
    if(center_distance <= abs(radius_1 - radius_2)){
        cout<< "Circle2 is inside Circle1" << endl;
    }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```
Enter the x co-ordinate(x1) of the first circle: 3
Enter the y co-ordinate(y1) of the first circle: 4
Enter the x co-ordinate(x2) of the second circle: 5
Enter the y co-ordinate(y2) of the second circle: 7
Enter the radius of the first circle: 5
Enter the radius of the second circle: 7
Radius is valid.
Circle2 overlaps circle1
```

Please click on the link : Problem 2.2

Problem 2.2:
Source code and Results:

```
    cin>> x2;
    cout<< "Enter the y co-ordinate(y2) of the second circle: ";
    cin>> y2;

    cout<< "Enter the radius of the first circle: ";
    cin>> radius_1;
    cout<< "Enter the radius of the second circle: ";
    cin>> radius_2;

    //part 1.1 : check whether the radius is correct input or not
    if(radius_1 > 0 && radius_2 > 0){
        cout << "Radius is valid." << endl;
    }
    else{
        cout<< "Radius is a lenth which can't be zero or negative, If the radius is zero then its a point not a circle" << endl;
    }

    //part 2: decide whether the second circle is inside the first one or not or overlaps each other
    double center_distance;
    //part 2.1 : center distance is found by using the formula to find the distance between two points
    center_distance = sqrt(pow((x2-x1), 2) + pow((y2-y1), 2));
    //part 2.2 : if the center distance is less than or equal than the absolute distances between the radious then circle_2 is inside circle_1
    if(center_distance <= abs(radius_1 - radius_2)){
        cout<< "Circle2 is inside Circle1" << endl;
    }
    //part 2.2 : if the center distance is less than or equal than the sum of the absolute distances between circle_2 is inside circle_1 the th
    else if(center_distance <= abs(radius_1 + radius_2)){
        cout<< "Circle2 overlaps circle1" << endl;
    }
    //part 2.2 : otherwise circle two doesn't overlap
    else{
        cout<< "Circle2 does not overlap Circle1" << endl;
    }
    return 0;
}
```

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   JUPYTER

Enter the x co-ordinate(x1) of the first circle: 3
Enter the y co-ordinate(y1) of the first circle: 4
Enter the x co-ordinate(x2) of the second circle: 5
Enter the y co-ordinate(y2) of the second circle: 7
Enter the radius of the first circle: 5
Enter the radius of the second circle: 7
Radius is valid.
Circle2 overlaps circle1
```

Please click on the link : Problem 2.2

Problem 2.3:
Source code and Results:

```cpp
#include<iostream>
using namespace std;
/*
This program prints all the leaps years from 2001 to 2100 sperated by a space and ten leaps years per line
*/
int main(){
    //part 1: declare the variables
    int year;

    //part 2: calculate the leap years and output it
    cout<<"All the leap years from 2001 to 2100 are: "<< endl;

    // count keeps track of the number of the years printed each line
    int count = 0;
    for(year = 2001; year <= 2100; year++){
        if(((year % 4)==0 && (year % 100)!=0) || (year % 400) == 0){

            cout<< year <<" ";
            count++;
            //when the reminder of the total count divided by zero is acheived it starts a new line
            if(count % 10 ==0){

                cout<< endl;
            }

        }
    }

    return 0;
}
```

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   JUPYTER

❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.3.cpp -o problem_2.3 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.3
All the leap years from 2001 to 2100 are:
2004 2008 2012 2016 2020 2024 2028 2032 2036 2040
2044 2048 2052 2056 2060 2064 2068 2072 2076 2080
2084 2088 2092 2096
```

Please click on the link : Problem 2.3

Problem 2.4:
Source code and Results:

```cpp
#include<iostream>
using namespace std;
/*
This program prompts the user to enter the year and first day of that years and returns the first day of each month of that year
*/

//use switch to get the string day name from int input
string first_day_of_year_string(int first_day_of_year){
    string dayString = "";
    switch(first_day_of_year){

        case 0: dayString = "Sunday"; break;
        case 1: dayString = "Monday"; break;
        case 2: dayString = "Tuesday"; break;
        case 3: dayString = "Wednesday"; break;
        case 4: dayString = "Thursday"; break;
        case 5: dayString = "Friday"; break;
        case 6: dayString = "Saturday"; break;


        }



        return dayString;

        }

int main(){
    //part 1 : prompt the user to enter the year and the first day of the year
    int year;
    cout<< "Enter the year: ";
    cin>> year;
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```
The peremeter of the triangle is: 19
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.1.cpp -o problem_2.1 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.1
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.2.cpp -o problem_2.2 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.2
Enter the x co-ordinate(x1) of the first circle: 3
Enter the y co-ordinate(y1) of the first circle: 4
Enter the x co-ordinate(x2) of the second circle: 5
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.4.cpp -o problem_2.4 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.4
Enter the year: 2023
Please enter the first day of the year: 0
January 1, 2023 is Sunday
February 2, 2023 is Wednesday
March 1, 2023 is Wednesday
April 1, 2023 is Saturday
May 1, 2023 is Monday
June 1, 2023 is Thursday
```

Please click on the link : Problem 2.4

Problem 2.4:
Source code and Results:

```
38      int first_day_of_year;
39      cout<< "Please enter the first day of the year: ";
40      cin>> first_day_of_year;
41
42
43      //part 2 : do the calculation and return the first day of each month of that year
44      int number_of_days_in_month;
45      string dayString = "";
46
47      for(int month = 1; month <=12; month++){
48          switch(month){
49
50              case 1: cout<< "January 1, " << year << " is ";
51              number_of_days_in_month = 31;
52              dayString = first_day_of_year_string(first_day_of_year);
53              cout<< dayString << endl;
54              break;
55
56              case 2: cout<< "February 2, " << year << " is ";
57              if((year % 4 ==0 && year % 100 != 0) || year % 400 ==0){
58                  number_of_days_in_month = 29;
59              }
60              else{
61                  number_of_days_in_month = 28;
62              }
63              dayString = first_day_of_year_string(first_day_of_year);
64              cout<< dayString << endl;
65              break;
66
67              case 3: cout<< "March 1, " << year << " is ";
68              number_of_days_in_month = 31;
69              dayString = first_day_of_year_string(first_day_of_year);
70              cout<< dayString << endl;
71              break;
72
73              case 4: cout<< "April 1, " << year << " is ";
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```
The peremeter of the triangle is: 19
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.1.cpp -o problem_2.1 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.1
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.2.cpp -o problem_2.2 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.2
Enter the x co-ordinate(x1) of the first circle: 3
Enter                                                  ircle: 4
Enter                                                  ircle: 5
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.4.cpp -o problem_2.4 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.4
Enter the year: 2023
Please enter the first day of the year: 0
January 1, 2023 is Sunday
February 2, 2023 is Wednesday
March 1, 2023 is Wednesday
April 1, 2023 is Saturday
May 1, 2023 is Monday
June 1, 2023 is Thursday
```

Focus folder in explorer (cmd + click)

Please click on the link : Problem 2.4

Problem 2.4:
Source code and Results:

```
71          break;
72
73          case 4: cout<< "April 1, " << year << " is ";
74          number_of_days_in_month = 30;
75          dayString = first_day_of_year_string(first_day_of_year);
76          cout<< dayString << endl;
77          break;
78
79          case 5: cout<< "May 1, " << year << " is ";
80          number_of_days_in_month = 31;
81          dayString = first_day_of_year_string(first_day_of_year);
82          cout<< dayString << endl;
83          break;
84
85          case 6: cout<< "June 1, " << year << " is ";
86          number_of_days_in_month = 30;
87          dayString = first_day_of_year_string(first_day_of_year);
88          cout<< dayString << endl;
89          break;
90
91          case 7: cout<< "July 1, " << year << " is ";
92          number_of_days_in_month = 31;
93          dayString = first_day_of_year_string(first_day_of_year);
94          cout<< dayString << endl;
95          break;
96
97          case 8: cout<< "August 1, " << year <
98          number_of_days_in_month = 31;
99          dayString = first_day_of_year_string(first_day_of_year);
100         cout<< dayString << endl;
101         break;
102
103         case 9: cout<< "September 1, " << year << " is ";
104         number_of_days_in_month = 30;
105         dayString = first_day_of_year_string(first_day_of_year);
106         cout<< dayString << endl;
107         break;
```

int first_day_of_year

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```
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Enter the year: 2023
Please enter the first day of the year: 0
January 1, 2023 is Sunday
February 2, 2023 is Wednesday
March 1, 2023 is Wednesday
April 1, 2023 is Saturday
May 1, 2023 is Monday
June 1, 2023 is Thursday
July 1, 2023 is Saturday
August 1, 2023 is Tuesday
September 1, 2023 is Friday
October 1, 2023 is Sunday
November 1, 2023 is Wednesday
December 1, 2023 is Friday
```

Please click on the link : Problem 2.4

Problem 2.4:
Source code and Results:

```
98              number_of_days_in_month = 31;
99              dayString = first_day_of_year_string(first_day_of_year);
100             cout<< dayString << endl;
101             break;
102
103             case 9: cout<< "September 1, " << year << " is ";
104             number_of_days_in_month = 30;
105             dayString = first_day_of_year_string(first_day_of_year);
106             cout<< dayString << endl;
107             break;
108
109             case 10: cout<< "October 1, " << year << " is ";
110             number_of_days_in_month = 31;
111             dayString = first_day_of_year_string(first_day_of_year);
112             cout<< dayString <<endl;
113             break;
114
115             case 11: cout<< "November 1, " << year << " is ";
116             number_of_days_in_month = 30;
117             dayString = first_day_of_year_string(first_day_of_year);
118             cout<< dayString <<endl;
119             break;
120
121             case 12: cout<< "December 1, " << year << " is ";
122             number_of_days_in_month = 31;
123             dayString = first_day_of_year_string(first_day_of_year);
124             cout<< dayString << endl;
125             break;
126         }
127         //getting the start day of the next month
128         first_day_of_year = (first_day_of_year + number_of_days_in_month) % 7;
129
130     }
131     return 0;
132 }
133
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```
❯ cd "/Users/student/Desktop/C++/Homeworks/HW2/" && g++ problem_2.4.cpp -o problem_2.4 && "/Users/student/Desktop/C++/Homeworks/HW2/"problem_2.4
Enter the year: 2023
Please enter the first day of the year: 0
January 1, 2023 is Sunday
February 2, 2023 is Wednesday
March 1, 2023 is Wednesday
April 1, 2023 is Saturday
May 1, 2023 is Monday
June 1, 2023 is Thursday
July 1, 2023 is Saturday
August 1, 2023 is Tuesday
September 1, 2023 is Friday
October 1, 2023 is Sunday
November 1, 2023 is Wednesday
December 1, 2023 is Friday
```

Please click on the link : Problem 2.4