ESS111 : Programming 1 (C Programming)
LAB - 3

Due: 9 December, 2020 @ 11:59 pm

Part A (to be submitted)

Problem 1: (Intersecting Circles) Given two circles with centers at (x_1, y_1) and (x_2, y_2) and having radius r_1 and r_2 respectively, are considered to be intersecting if they have a non-zero common area. If the two circles touch at a point they are considered to be touching. Write a (C) program to input integer values of $(x_1, y_1, r_1, x_2, y_2, r_2)$, output `"Intersect"` if the circles have a non-zero common area, output `"Touch"` if the circles touch each other, otherwise output `"No Intersection"` (without the quotes).
Note: If one of the radius values is negative, output should be `"Invalid Input"`. Radius value of 0 is acceptable.

Sample Input 1:
1 2 4 5 5 1

Output 1:
Touch

Sample Input 2:
3 4 -3 4 5 4

Output 2:
Invalid Input

Problem 2: In digital world, colors are specified in Red-Green-Blue (RGB) format, with values of R, G, B varying on an integer scale from 0 to 255. In print world, publishing the colors are mentioned in Cyan-Magenta-Yellow-Black (CMYK) format, with values of C, M, Y, and K varying on a real scale from 0.0 to 1.0. Write a (C) program that converts RGB color input as three integers(corresponding to Red, Green, Blue respectively), to CMYK color outputting the four colours in their respective order(upto 2 decimal places) as per the following formulae:

$White = Max(Red/255, Green/255, Blue/255)$

$Cyan = \frac{White - Red/255}{White}$

$Magenta = \frac{White - Green/255}{White}$

$Yellow = \frac{White - Blue/255}{White}$

$Black = 1 - White$

Note: If the RGB values are all 0, then the CMY values are all 0 and the K value is 1.

Sample Input 1:
51 51 85

Output 1:
0.40 0.40 0.00 0.67

Sample Input 2:
51 51 51

Output 2:
0.00 0.00 0.00 0.80

Problem 3: A certain grade of steel is graded according to the following conditions:

(i) Hardness must be greater than 50

(ii) Carbon content must be less than 0.7

(iii) Tensile strength must be greater than 5600

The grades are as follows:

I. Grade is 10 if all three conditions are met.

II. Grade is 9 if conditions (i) and (ii) are met.

III. Grade is 8 if conditions (ii) and (iii) are met.

IV. Grade is 7 if conditions (i) and (iii) are met.

V. Grade is 6 if only one condition is met.

VI. Grade is 5 if none of the conditions are met.

Write a program, which will require the user to give the values of hardness(as integer), carbon content(as float) and tensile strength(as integer) of the steel under consideration and output the grade of the steel(as integer).

Sample Input 1:
167 0.67 6700

Output 1:
10

Sample Input 2:
46 0.92 4600

Output 2:
5

Problem 4: Three vertices of a triangle $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ are given. Write a (C) program that takes integer inputs $(x_1, y_1, x_2, y_2, x_3, y_3)$ and outputs whether the given triangle is `"Equilateral"`,`"Isosceles"` or `"Scalene"` (without the quotes).
Note: If the given vertices do not make a triangle, output `"Not Triangle"`.
Fun Fact: An equilateral triangle can't have all the coordinates of it's vertices rational at the same time.

Sample Input 1:
0 0 1 1 2 2

Output 1:
Not Triangle

Sample Input 2:
0 0 6 0 3 4

Output 2:
Isosceles

Part B (need not be submitted)

1. Which of the following will give a syntax error in C?
   A. >= B. <> C. != D. ==

2. Which of these is a logical operator?
   A. & B. || C. += D. >>

3. What is the output when the following piece of (C) code is executed?

```
int a = 10;
int b = 2;
printf("%d\n", 10*b+a-b*a/b);
```

   Answer : 20

4. What is the output when the following piece of (C) code is executed?

```
int a = 31;
printf("%x\n", a);
```

   Answer : 1f

5. Which of these is NOT an assignment operator?
A. $*=$ B. $==$ C. $\%=$ D. $/=$