April 22, 2022

CSE108 – Computer Programming Laboratory
Spring 2022, May 7
Lab #10

PART 1 (80 pts)

Write a complete C program that takes the *coordinates of the center point and a passing through point P of a number of different circles* as inputs. Then calculate the radius, perimeter and area of these circles. To save these values, use 2 structs as follows:

1. **struct coordinates** (variables: int x, int y)
2. **struct circle** (variables: struct coordinates points[2], float radius, float perimeter, float area)

You cannot save the coordinates of a circle in "struct circle" directly, you should use *"struct coordinates"* as a variable.

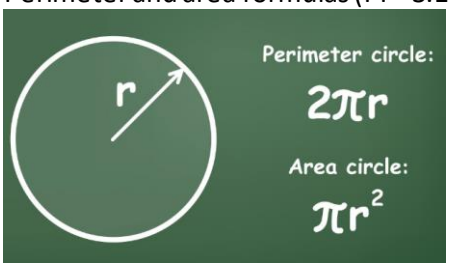
Once the program reads the inputs and makes the calculations, you should print the calculated values in an ascending order (from smallest circle to the largest one). To do this, you should use a recursive function called **void print_struct**.

Notes:

1. You should use an array of 'struct circle'. The number of the circles should be decided by user (if you are not dynamically allocating it, initialize the array with 10 elements).
2. The *print_struct* function should not sort array, every time it is being called, it should find the correct circle to print, and then call itself again to print the next circle (if any).
3. The following should be printed in *print_struc*t function: index of the circle (according to the order of inputs), radius, perimeter and area.
4. Distance between two points:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Perimeter and area formulas (PI = 3.14)



PART 2 (80 pts)

Write a complete C program that takes an integer as an input and print its prime multipliers. If the input itself is a prime number, the program should print this information. You should use a recursive function called **is_prime** to check if a number is prime, and another recursive function called **factorization** which finds and print the prime multipliers.

General notes:

- Using a function from an existing library, other than sqrt(), is not allowed.
- Write a makefile and add comments to your code.

Example inputs & outputs

```
PART1

Number of circles: 3

Circle 1...
Coordinates of center:  0 0
Coordinates of point P: 2 0

Circle 2...
Coordinates of center:  0 0
Coordinates of point P: 1 0

Circle 3...
Coordinates of center:  0 0
Coordinates of point P: 5 0


Printing circles in an ascending order...

Circle 2        Radius: 1.00    Perimeter: 6.28         Area: 3.14
Circle 1        Radius: 2.00    Perimeter: 12.56        Area: 12.56
Circle 3        Radius: 5.00    Perimeter: 31.40        Area: 78.50



PART 2

Enter a number: 98
98 = 7*7*2*
```

```
PART1

Number of circles: 4

Circle 1...
Coordinates of center:  6 5
Coordinates of point P: 5 1

Circle 2...
Coordinates of center:  2 3
Coordinates of point P: 3 5

Circle 3...
Coordinates of center:  2 9
Coordinates of point P: 9 0

Circle 4...
Coordinates of center:  0 0
Coordinates of point P: 5 7


Printing circles in an ascending order...

Circle 2        Radius: 2.24    Perimeter: 14.04        Area: 15.70
Circle 1        Radius: 4.12    Perimeter: 25.89        Area: 53.38
Circle 4        Radius: 8.60    Perimeter: 54.02        Area: 232.36
Circle 3        Radius: 11.40   Perimeter: 71.60        Area: 408.20



PART 2

Enter a number: 29
29 is a prime number.
```