

ECE 1261: Lab Assignment 2

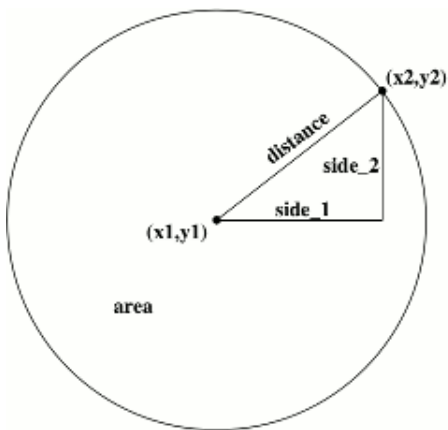
We will once again start with a copy of program `chapter1_1` shown on pages 18 and 25-26 of your course textbook. This program computes the straight-line distance between two points in a plane. This program has been given to you in the accompanying file called `chapter1_1.c` on Blackboard. You will be using the C code from this file as the starting point for the instructions given below.

1. On Blackboard, open the file "`chapter1_1.c`" and copy-paste its contents into the programming environment.
2. Insert a comment at the very top of the program with your name and a brief description of the program, e.g.

```
// your name  
// modifying chapter1_1.c
```

3. Compile and run the program to make sure it works.

PART A: Area of a circle



Assume that $x1$, $y1$ represent the coordinates of the center of a circle, and $x2$, $y2$ represent a point on the circumference of the circle.

Modify the program such that it first computes the radius of the circle using the distance formula. Next, using this computed value of radius it then computes and displays the area of the circle.

4. Create (declare) and use new variables, e.g. `double radius, area;` for the radius and area computations.

5. π (you can call it `PI`) should be defined as a constant by using the `#define` statement, and setting the value to `(4*atan(1))`. Can you guess how we get this value? `atan()` is the arctangent i.e. \tan^{-1} function, which gives the angle in radians, associated with a tangent value. This function is part of the C math library, `math.h`

6. The program must display the input values (`x1, y1, x2, y2`) as well as the computed output (`area`), for e.g. `printf("x1 = %g\n", x1);` Then compile and run. Your program output must look like this on the display: PART A: AREA OF CIRCLE

When `x1=1, y1=5, x2=4, y2=7`, the area of the circle is 40.8407

PART B: Surface area of a sphere

7. This part is a continuation of the program that you just wrote. Do not delete or overwrite your earlier code. Insert this part of the program just before the `return 0;` statement in `main()`. First, write a comment using `//...` that briefly describes the program, part B.

You may assume that the radius of the sphere is the same radius that you have calculated earlier. Therefore, there is no need to recalculate the value of the radius; you may simply reuse the value stored in the `radius` variable without change.

8 Compute the value of the surface area of the sphere using the formula:

$$\text{surface_area} = 4\pi r^2$$

Note: you will need to modify the above formula so that you can use the variables and constants that you have created. For instance, substitute `PI` for π and `radius` for r in the above formula. Store the result in a new variable called `surface_area` (don't forget to declare it first).

9. Your program output must look like this on the display (in addition to the output from part A which should be displayed as well):

```
PART B: SURFACE AREA OF SPHERE
```

```
The surface area of the sphere is 163.363
```

10. Upload your code to Blackboard using the provided upload link under “Lab Assignments”.