**PROBLEM**:
Write a program to compute the perimeter and area of a polygon using an input data file and an output file. A file **lab4.c** is provided with some of the print statements in it.

- It is your responsibility to read the Power Point files:
  - C-3 Characters ControlStructures.pptx, #20-57 on the various Ifs and Switch
  - C-4 Loops.pptx, #1-24
  - Ask any needed questions in class

To get the files you need, first move to your **csc60** directory: **cd csc60**
The following command will create a directory named **lab4** and put all the needed files into it below your csc60 directory.

Type: **`cp -R /gaia/home/faculty/bielr/files_csc60/lab4 .`**
Spaces needed: (1) After the **cp** ↑ space & dot
(2) After the **-R**
(3) After the directory name at the end & before the dot.

After the files are in your account and you are still in **csc60**, you need to type: **chmod 755 lab4**
This will give permissions to the directory.
Next move into lab4 directory [**cd lab4**], and type: **chmod 644 lab4*.***
This will give permissions to the files.
Your new lab4 directory should now contain: lab4.c, lab4.dat, lab4sample.dat

**INPUT/OUTPUT DESCRIPTION**:

- The **test data** will be a file called **lab4sample.dat.** Use it to verify the correctness of your program. It has 3 sets of data.
- The **final data** will be a file called **lab4.dat**. It has 6 sets of data.
- Each line or record of the file will consist of two numbers: the radius and the number of sides of the polygon.
- Print your name and assignment (use fprintf)
- Use an *fscanf* statement in a *while* loop to repeatedly get each set of values. It would be a good idea to make these variable type *double*.
- **The output** will be a file, **lab4.out.** The output of the sample data will follow.

**FORMULAS**

- Remember to translate the algebra of the two formulas into the C language.

  **Perimeter** of the polygon = $2n R \sin \frac{PI}{n}$

  **Area** of the polygon = $\frac{1}{2} n R^2 \sin \frac{2 PI}{n}$

**DATA FILES**:
There are two data files:

- lab4sample.dat – Use it to verify the correctness of your program
- lab4.dat

**ALGORITHM DEVELOPMENT**:
Open the data file **lab4sample.dat** or **lab4.dat**
Do the appropriate error checking

Open the output file **lab4.out**
Do the appropriate error checking

Print your name and assignment. Then print the column header lines needed. (use fprintf)

while ((fscanf(..., &radius, &nsides)) == 2)
| Compute the perimeter and area of the polygon.
|_ fprintf the radius, nsides, perimeter, and area as in the Defined Output Appearance.

Close the two files

**VIEWING OUTPUT**
When you run the program, the whole thing is going to **lab4.out**. Open that file to see your output. Use either "cat" or "vim".

**REMINDERS**:
- Include your name and lab4 in your comment block, and in your output.
- All numeric variables are to be type **double**.
- Most of the print and fprintf statements are included in lab4.c for you. You need to write the fprintf in the loop.
- The input file name, which will be changed, ought to be in a #define statement. The file will come with two #define statements, for the test file and the final file. Just move the **//** from in front of one #define statement to the other #define statement.
  **#define INFILE lab4sample.dat**
  **// #define INFILE lab4.dat**
- FOR THE VALUE OF PI, use **M_PI** from math.h (which we already have included).
- To compile, you will need to add **–lm** so math.h can be found. Type: **gcc –lm lab4.c**

**DEFINED OUTPUT APPEARANCE (*using lab4sample.out*)**:

```
Your Name.  Lab 4.

            Number       Perimeter       Area Of
 Radius    Of Sides    Of Polygon       Polygon
--------   --------   ------------   -----------
  12.60      24.00        78.9422      493.0813
   5.60       8.00        34.2884       88.6995
   7.85      12.00        48.7615      184.8675
```

**PREPARE YOUR FILE FOR GRADING:**

Make sure your program has been corrected from:
using **lab4sample.dat** to using **lab4.dat**
and has been re-complied.

When all is well and correct,
at the prompt, type: **script StudentName_lab4.txt** [Script will keep a log of your session.]
At the prompt, type: **gcc -lm lab4.c** to compile the code
At the prompt, type: **a.out** to run the program
At the prompt, type: **cat lab4.out** to show contents of the output file
After the program run is complete,
type: **exit** to leave the script session

**Turn in your completed session:**

Go to Canvas and turn in two files:

1. lab4.c
2. StudentName_lab4.txt