CEG 2170
Laboratory 3

The purpose of this lab is practice using and writing functions.

Turn In: Upload both lab 3 projects with fully commented source code (including header comments), as required in the course style guide.

Part I

Create a new project and program file that outputs the results of each of the following expressions. Include the problem number in the output. For instance, the output statement for **part a** below is:

```
printf( "Expression a = %f", ceil(16.2));
```

a. ceil(16.2)

b. floor(-7.5) * pow(3.0, 2.0)

c. sqrt(ceil(fabs(-7.4)))

d. $\sqrt{3+13} * 5^2$

e. $\sqrt{(12-3)^3}$

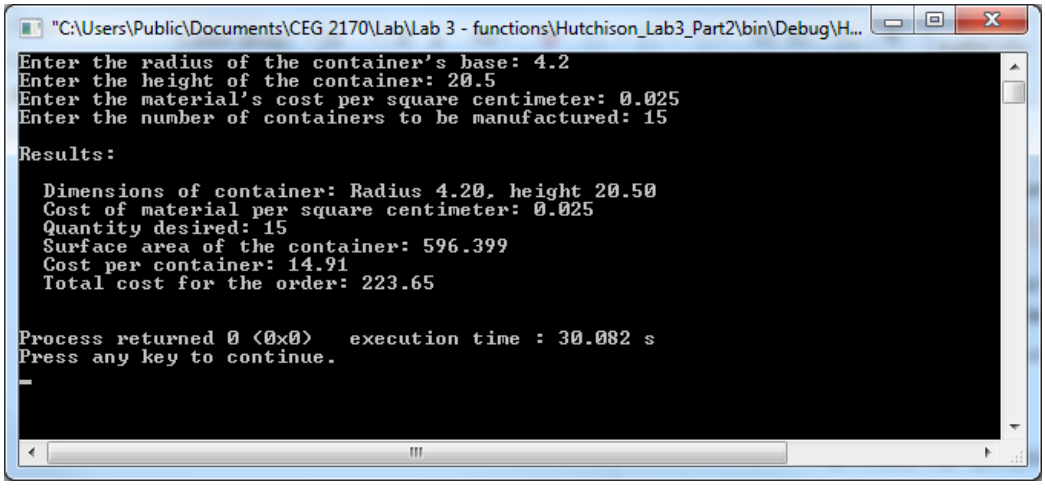
Make sure you include the **math.h** library in addition to **stdio.h**.

Part II

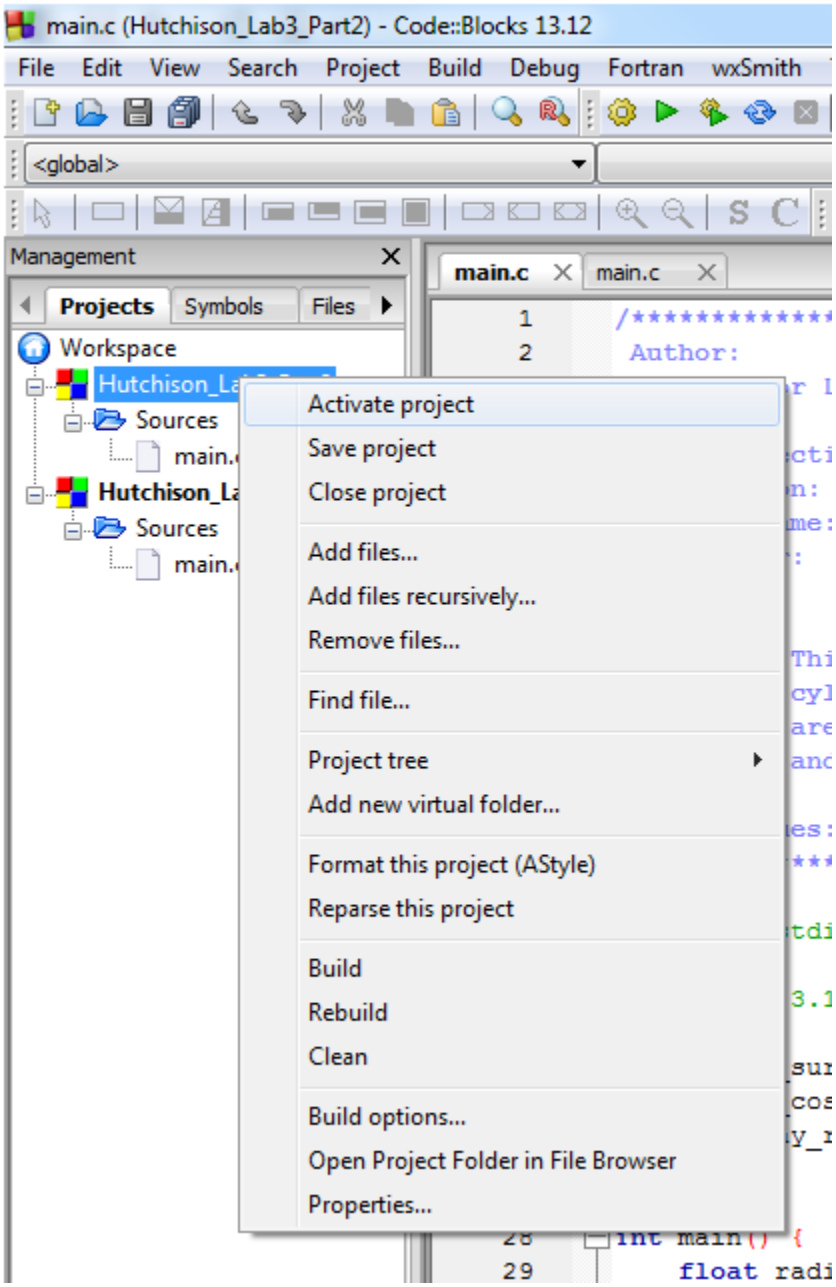
Create a new project and source code file and enter the partially-finished program shown on the following pages. Complete the program where indicated by the comments:

- The call to the **`calc_cost`** function in main
- The body of the **`calc_surface_area`** function
- The comments for the **`calc_cost`** function
- The body of the **`display_results`** function

Run your program to be sure your results match those of the sample program run below.



Note: When running multiple projects in CodeBlocks at the same time, you must activate the project you want to run. For example, I right-click on the **Hutchison_Lab3_Part1** project to activate it. At this time, the build and run options will only work with this project. If I want to build or run **Hutchison_Lab3_Part2**, then I must right-click and activate it.



```c
#include <stdio.h>

#define PI 3.14159

float calc_surface_area( float radius, float height);
float calc_cost( float surface_area, float cost_per_sq_cm);
void display_results( float radius, float height, float cost_per_sq_cm, int quantity,
                      float surface_area, float cost_per_container, float total_cost);

int main() {
    float radius, height, cost_per_sq_cm;
    int quantity;
    float surface_area, cost_per_container, total_cost;

    //input container dimensions, material cost, quantity
    printf("Enter the radius of the container's base: ");
    scanf( "%f", &radius);
    printf( "Enter the height of the container: ");
    scanf( "%f", &height);
    printf( "Enter the material's cost per square centimeter: ");
    scanf( "%f", &cost_per_sq_cm);
    printf( "Enter the number of containers to be manufactured: ");
    scanf( "%d", &quantity);

    //calculations
    surface_area = calc_surface_area(radius, height);

   /*call the calc_cost function here and store the result in the
     cost_per_container variable */

    total_cost = cost_per_container * quantity;

    //display results
    printf("\nResults:\n\n");
    display_results(radius, height, cost_per_sq_cm, quantity,
                    surface_area, cost_per_container, total_cost);

    return 0;
}
```

```
/*****************************************************************
 This function calculates the surface area of an open-top cylinder
 given the radius of the base and the height of the cylinder

 Input parameters:  radius of the base; must be greater than 0.
                    height of the cylinder; must be greater than 0
 Return:  surface area of the open-top cylinder
*****************************************************************/
float calc_surface_area( float radius, float height) {

    /* fill in the code for this function */

}

/*****************************************************************

    fill in the comments for this function

*****************************************************************/
float calc_cost( float surface_area, float cost_per_sq_cm) {
    return surface_area * cost_per_sq_cm;
}


/*****************************************************************
 This function displays all items listed in the parameter list.

 Input parameters: radius and height of the cylinder, cost of material,
                   quantity to be produced, surface area of the container,
                   cost to produce each container, total cost to produce
                   the given quantity
 Return: none
*****************************************************************/
void display_results( float radius, float height, float cost_per_sq_cm,
                      int quantity,  float surface_area,
                      float cost_per_container, float total_cost) {

    /* fill in the code for this function so that the output
       matches that shown in the sample program run */

}
```