ECE 270

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Quiz #2
Area of a Triangle
(and Other Calculations)

September 16, 2014

1. Statement of the Problem

The purpose of this program is to perform various geometric calculations based on user input. Two functions were assigned: area of a triangle, and perimeter, area, and diameter of a circle. I chose volume of a sphere for the third function.

2. Description of solution

Instead of three programs, one for each of the mathematical calculations assigned, I chose to integrate the three into a single program that allows the user to choose which of the functions they wish to perform, and afterwards if they'd like to do another or quit.

To accomplish this, I defined 4 functions:

```
void menu();
void circle();
void triangle();
void sphere();
```

The `menu` function displays a list of the functions of the program and allows the user to make a selection using a `switch` statement.

The `circle` and `sphere` functions allow the user to input the radius and the circle function outputs the diameter, area, and perimeter of the circle, the sphere function outputs the volume of the sphere.
The `triangle` function allows the user to input base and height dimensions of the triangle and outputs the area

The calculations all take place in the `printf` statements to make efficient use of functions and variables like so:

Circle:

```
printf("\nThe area of your circle is: \t\t%.2f\nThe diameter of your circle is:\t\t %.2f\nThe
perimeter of your circle is:\t %.2f",PI*(radius)*(radius),2*radius,2*PI*radius);
```

Sphere:

```
printf("\n\The area of your triangle is %.2f",.5*base*height);
```

Triangle:

```
printf("\n\nThe volume of your sphere is %.2f",4*PI*(radius*radius*radius)/3);
```

3. Output and Testing

To test the program I calculated with 2 data sets, radius=1 and radius=2 for the circle and sphere calculators and base=1 height=1 and base=2 height=2 for the triangle.

Selection screen:

```
Welcome to Justin Newman's ECE270 Quiz #2 geometry program

Please make your selection from the following menu:

T:      Calculate area of a triangle
C:      Calculate area, diameter, and perimeter of a circle
S:      Calculate volume of a sphere
Q:      To quit

Please enter your selection now:
```

Triangle Calculator:

```
     Justin Newman's Triangle Calculator!!

     Please enter the base of your triangle1

     Please enter the height of your triangle1

     The area of your triangle is 0.50

     Press any key to return to the selection screen
```

And

```
     Justin Newman's Triangle Calculator!!

     Please enter the base of your triangle2

     Please enter the height of your triangle2

     The area of your triangle is 2.00

     Press any key to return to the selection screen
```

Circle Calculator:

```
Justin Newman's Circle Calculator!!

Please enter the radius of your circle1

The area of your circle is:             3.14
The diameter of your circle is:          2.00
The perimeter of your circle is:         6.28

Press any key to return to the selection screen
```

And

```
Justin Newman's Circle Calculator!!

Please enter the radius of your circle2

The area of your circle is:            12.57
The diameter of your circle is:          4.00
The perimeter of your circle is:         12.57

Press any key to return to the selection screen
```

Sphere Calculator:

```
Justin Newman's Sphere calculator!!

Please enter the radius of your sphere1

The volume of your sphere is 4.19

Press any key to return to the selection screen
```

And

```
Justin Newman's Sphere calculator!!

Please enter the radius of your sphere2

The volume of your sphere is 33.51

Press any key to return to the selection screen
```

I verified the results by calculator and they are correct.

4. Code

```
1  /*Justin Newman
2  ECE270 9/10/14
3  Quiz #2*/
4
5  #include<stdio.h>
6  #include<stdlib.h>
7
8  #define PI 3.14159265358979323846264338327795
9
10 void menu();
11 void circle();
12 void triangle();
13 void sphere();
14
15 int main()
16     {
17
18         char selection;
19
20         //Call menu function
21         menu();
22
23         //Loop for allowing use of all three functions of the program without restarting
24         do
25             {
26
27                 scanf("\n%c",&selection);
28
29                 switch(selection)
30                     {
31                     case 'T':case 't':
32                         system("cls");
33                         triangle();
34                         menu();
35                     break;
36                     case 'C':case 'c':
37                         system("cls");
38                         circle();
39                         menu();
40                     break;
41                     case 'S':case 's':
42                         system("cls");
43                         sphere();
44                         menu();
45                     break;
46                     case 'Q':case 'q':
47                         system("cls");
48                         printf("\nProgram terminating...\ngoodbye");
49                     break;
50                     default :
51                         system("cls");
52                         printf("\nPlease make a valid selection from the following menu:\n");
53                         menu();
54                     }
55
56             }while(selection!='Q'||selection!='q');
57
58
59     return 0;
60
61     }
62
63 void menu()
64     {
65         //Displays function selection menu
66         printf("\nWelcome to Justin Newman's ECE270 Quiz #2 geometry program");
67         printf("\n\nPlease make your selection from the following menu:");
```

```
68          printf("\n\nT:\tCalculate area of a triangle");
69          printf("\nC:\tCalculate area, diameter, and perimeter of a circle");
70          printf("\nS:\tCalculate volume of a sphere");
71          printf("\nQ:\tTo quit");
72          printf("\n\nPlease enter your selection now:");
73      }
74
75  void circle()
76      {
77
78          //Define vars
79          float radius=0;
80
81          printf("\nJustin Newman's Circle Calculator!!");
82
83          //Get input
84          printf("\n\nPlease enter the radius of your circle");
85          scanf("\n%f",&radius);
86
87          //Efficient code for calculating and printing the desired quantities
88          printf("\nThe area of your circle is: \t\t%.2f\nThe diameter of your circle is:\t\t
%.2f\nThe perimeter of your circle is:\t %.2f",PI*(radius)*(radius),2*radius,2*PI*radius);
89          printf("\n\nPress any key to return to the selection screen");
90
91          //Hold for user input
92          getch();
93
94          //Clear screen
95          system("cls");
96
97      }
98
99  void triangle()
100     {
101
102         //Define vars
103         float base=0, height=0;
104
105         printf("\nJustin Newman's Triangle Calculator!!");
106
107         //Get input
108         printf("\n\nPlease enter the base of your triangle");
109         scanf("\n%f",&base);
110         printf("\nPlease enter the height of your triangle");
111         scanf("\n%f",&height);
112
113         //Efficient code for calculating and printing the desired quantities
114         printf("\n\The area of your triangle is %.2f",.5*base*height);
115         printf("\n\nPress any key to return to the selection screen");
116
117         //Hold for user input
118         getch();
119
120         //Clear screen
121         system("cls");
122
123     }
124
125 void sphere()
126     {
127         //Define vars
128         float radius=0;
129
130         printf("\nJustin Newman's Sphere calculator!!");
131
132         //Get input
133         printf("\n\nPlease enter the radius of your sphere");
134         scanf("\n%f",&radius);
135
136         //Efficient code for calculating and printing the desired quantities
137         printf("\n\nThe volume of your sphere is %.2f",4*PI*(radius*radius*radius)/3);
```

```
138         printf("\n\nPress any key to return to the selection screen");
139
140         //Hold for user input
141         getch();
142
143         //Clear screen
144         system("cls");
145
146     }
```