Homework 2

Due Date: 1/23/15
Files to submit: **leapyear.c**, **quad.c**, **prism.c, ReadMe.txt**

- All programs must compile without warnings when using the -Wall option
- If you are working in a group **ALL** members must submit the assignment on SmartSite
- Submit only the files requested
  - Do **NOT** submit folders or compressed files such as .zip, .rar, .tar, .targz, etc
- All output must match the provided solution in order to receive credit
  - We use a program to test your code so it must match exactly to receive credit
- All input will be valid unless stated otherwise
- The examples provided in the prompts do not represent all possible input you can receive. Please see the Tests folder for each problem for more adequate testing
- All inputs in the examples in the prompt are underlined
- If you have questions please post them to Piazza

Restrictions
- No global variables are allowed
- Your main function may only declare variables and call other functions.

1. leapyear.c (My Time 5 mins) Write a program called **leapyear.c** that asks the user for a year and tells them whether or not the year is a leap year. A leap year is any that is a multiple of 4 except those that years that are a multiple of 100, however years that are a multiple of 400 are also a leap year. For more details on what is a leap year see here:
   https://www.timeanddate.com/date/leapyear.html
   1. Name your executable **leapyear.out**
   2. Examples
      1. ```
         Please enter a year: 1600
         1600 is a leap year.
         ```
      2. ```
         Please enter a year: 600
         600 is not leap year.
         ```
      3. ```
         Please enter a year: 36
         36 is a leap year.
         ```
      4. ```
         Please enter a year: 29
         29 is not leap year.
         ```
      5. ```
         Please enter a year: 200
         200 is not leap year.
         ```

2. quad.c (My time 5 min) A quadratic equation is an equation with the following form ax^2*bx*c . The roots of a quadratic equation are the values of x that cause the equation to evaluate to 0 and can be solved using the quadratic formula: $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$ Write a program called **quad.c** that asks the user to enter the coefficients, a, b and c, and solves for x. Note that there can be either 2 real answers, 1 real answer, or no real answers depending on the values of a, b, and c.

1. Name your executable **quad.out**
2. Only use doubles for this problem
3. Report your answer to 2 decimal places
4. a will never be 0
5. You may need to link in the math library in order to get your program to compile. To do this add the -lm command at the end of your compile statement. Your compile statement should look like: `gcc -g -Wall -o quad.out quad.c -lm`
6. Examples:

```
1. Given a quadratic equation of the form a*x^2 + b * x + c
   Please enter a: 1
   Please enter b: 2
   Please enter c: 1
   There is one real solution: -1.00
2. Given a quadratic equation of the form a*x^2 + b * x + c
   Please enter a: 4
   Please enter b: 3
   Please enter c: 7
   There are no real solutions
3. Given a quadratic equation of the form a*x^2 + b * x + c
   Please enter a: 3
   Please enter b: 11
   Please enter c: 8
   There are 2 real solutions
   Solution 1: -1.00
   Solution 2: -2.67
```

3. prism.c (My Time 25 mins) Write a program called **prism.c** that asks the user for the vertices of a rectangular prism located in 3-D space. Your program should calculate the surface area and volume of the prism.
   1. Name your executable **prism.out**
   2. Use doubles for this program
   3. You may need to link in the math library in order to get your program to compile. To do this add the -lm command at the end of your compile statement. Your compile statement should look like: `gcc -g -Wall -o prism.out prism.c -lm`
   4. Your program should have at least the following functions
      1. **get_dist**: this will calculate the distance between 2 points
      2. **get_rect_area:** this will calculate the area of rectangle
      3. **get_surface_area:** this will calculate the surface area of the prism and should make use of at least **get_rect_area**
      4. **get_volume**: this will calculate the volume of the prism
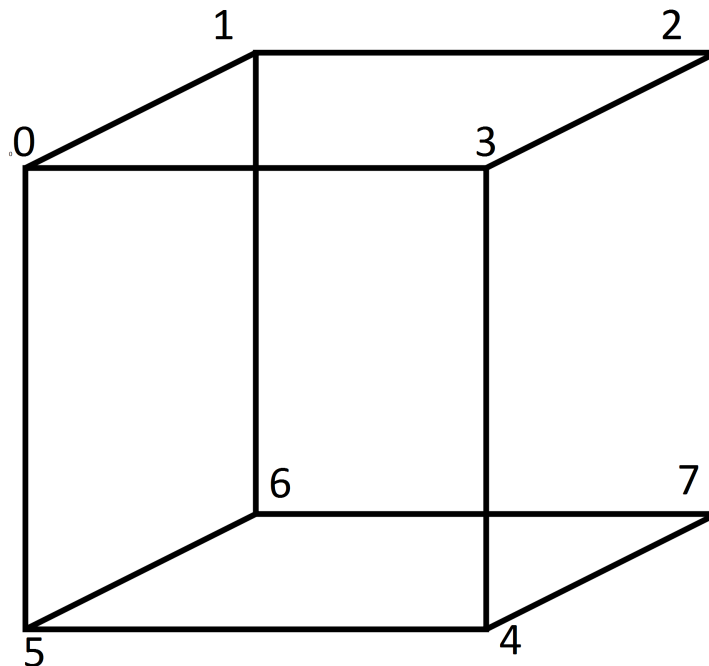
   5. The points of the cube will be entered from 0 to 7 based on the above diagram
   6. Examples
      1.
```
Enter the first coordinate in the form x y z: 1 -1  1
Enter the second coordinate in the form x y z: -1 -1  1
Enter the third coordinate in the form x y z: -1  1  1
Enter the fourth coordinate in the form x y z: 1  1  1
Enter the fifth coordinate in the form x y z: 1  1 -1
Enter the sixth coordinate in the form x y z: 1 -1 -1
Enter the seventh coordinate in the form x y z: -1 -1 -1
Enter the eighth coordinate in the form x y z: -1  1 -1
The surface area of the prism is 24.00
```

The volume of the prism is 8.00

2. Enter the first coordinate in the form x y z: <u>67.71 68.77 22.89</u>
   Enter the second coordinate in the form x y z: <u>64.28 59.84 25.81</u>
   Enter the third coordinate in the form x y z: <u>51.38 69.66 40.69</u>
   Enter the fourth coordinate in the form x y z: <u>54.81 78.59 37.77</u>
   Enter the fifth coordinate in the form x y z: <u>35.72 80.16 20.19</u>
   Enter the sixth coordinate in the form x y z: <u>48.62 70.34 5.31</u>
   Enter the seventh coordinate in the form x y z: <u>45.19 61.41 8.23</u>
   Enter the eighth coordinate in the form x y z: 3<u>2.29 71.23 23.11</u>
   The surface area of the prism is 2104.53
   The volume of the prism is 5722.34