Homework 2

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.

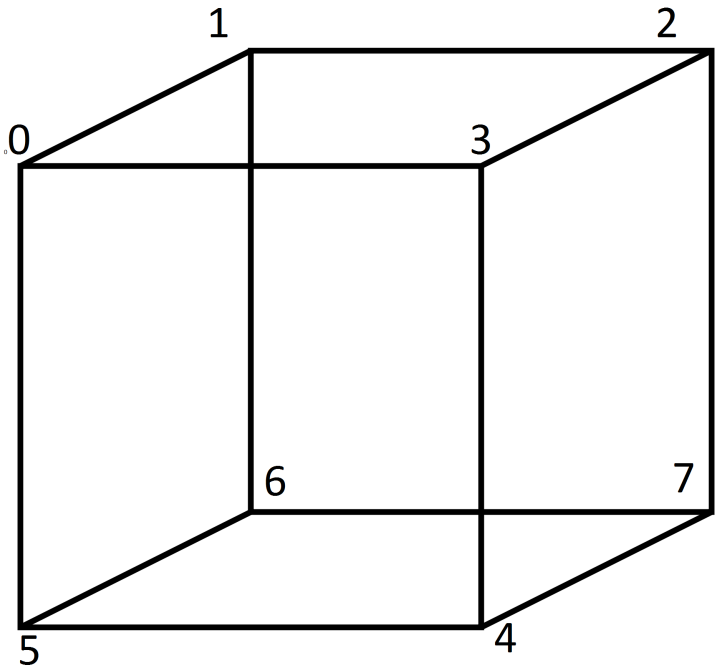
1. leapyear.c (My Time 5 mins) Write a program called **leapyear.c** that asks the user for a year and tells them whether or not the year is a leap year. A leap year is any that is a multiple of 4 except those that years that are a multiple of 100, however years that are a multiple of 400 are also a 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: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 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. Because of rounding issues when creating the cubes, the cubes are not perfect cubes, so it matters what edges you use in your calculations.. To match my answers you must use only edges 0 to 1, 1 to 2, and 3 to 4.
   7. 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: 67.71 68.77 22.89
Enter the second coordinate in the form x y z: 64.28 59.84 25.81
Enter the third coordinate in the form x y z: 51.38 69.66 40.69
Enter the fourth coordinate in the form x y z: 54.81 78.59 37.77
Enter the fifth coordinate in the form x y z: 35.72 80.16 20.19
Enter the sixth coordinate in the form x y z: 48.62 70.34 5.31
Enter the seventh coordinate in the form x y z: 45.19 61.41 8.23
Enter the eighth coordinate in the form x y z: 32.29 71.23 23.11
The surface area of the prism is 2104.53
The volume of the prism is 5722.34