

CS 150 Lab 05

Increments and while Loops

The purpose of today's lab is to for you to get some hands-on experience with the different things you can do with loops and ++/--.

- Be sure your output looks exactly like the specified output.
- Be sure to drop your solutions in to **CS150-02 Drop by 5pm Friday!**
- Show the instructor to TA your solution to each problem before submitting it.

Lab 5.1

Copy the folder Lab05_1 from the **Public** folder on Turing to your Desktop. Rename this folder Lab05_1_XXXXXX where XXXXXX is your PUNetID.

In this lab, you will be writing code that uses the increment and decrement operators (**++ --**). The project you were given contains three variable declarations and a number of comments describing code you need to write. The first set of comments describes lines of code you need to write using the **++** and **--** operators. The second set of comments lists lines of code that use the **++** and **--** operators and you are to rewrite those lines of code without the **++** or **--** operators. Write your code immediately under the comment that describes the calculation and before the **cout** statement. The expected output of the program is shown below.

An example is shown in the code for each set of comments.

Expected Output

0	0	-1
0	0	0
1	0	0
1	-9	1
4	0	0
5	12	1
23	13	2
25	13	3

- **Show the instructor or TA your solution before submitting it.**

Lab 5.2

For this lab, you will need to create a new Visual Studio project that will contain your source code. Name this project "Lab05_2_XXXXXXXX", replacing the XXXXXXXX with your PUNetID..

Write a program that will display all of the following.

Sample Input and Output:

```
*****  
* Loopy *  
*****  
  
How many iterations would you like to loop? 5  
  
Iteration      Multiples of 2      Squares  
-----  
1              2                  1  
2              4                  4  
3              6                  9  
4              8                  16  
5              10                 25
```

- Show the instructor or TA the answers to questions 1-3 before writing any code

1) List the variable declarations necessary to store the data listed in 1.

2. Briefly describe the calculations you will need to perform in your program. Be sure to explain which variables from 1 will be used in each calculation.

3. For each loop used in your program, discuss what will happen in the loop and what data and conditions will be used by the program to stop the loop.

Lab 5.3 (Challenge)

In mathematics, it is often useful to approximate the value of Pi. The more terms in the approximation the better it is. An early approximation of Pi is given below:

$$\pi = 4 \sum_{k=0}^{\infty} \frac{(-1)^k}{2k+1} = \frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \dots$$

Image from <http://en.wikipedia.org/wiki/Pi>

We cannot sum to infinity but we can use a computer to sum a large number of values. Write code that will approximate *Pi*. Ask the user for the maximum value for k. Once you've approximated Pi, compare your calculated value to the following (again given by Wikipedia):

3.1415 9265 3589 7932 3846 2643 3832 7950 288

Display as many digits after the decimal place as you can.

Note: These challenges make great exam study questions!