

# CS 150 Lab 06

## Loops, Loops, Loops

The purpose of today's lab is to for you to get some hands-on experience with the different types of loops.

- 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 6.1

For this lab, you will need to create a new Visual Studio project that will contain your source code. Name this project "Lab06\_1\_XXXXXXXX", replacing the XXXXXXXX with your PUNetID.

Ask the user for scores on 10 quizzes. Display to the user:

- average quiz score
- average quiz score after dropping the lowest score
- average quiz score after dropping the highest and lowest score

Be sure to use constants where appropriate!

1. List each variable declaration necessary to store the data and information in your program. The variable name and type must be enough information to describe the information the variable holds.

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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.

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

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### Sample Input/Output

```
//////////  
  Quiz Grader!  
\\\\\\\\\\\\\\\\  
  
Please enter 10 quiz grades:  
15  
16  
17  
16  
15  
0  
19  
20  
14  
15  
  
Results  
-----  
Average: 14.70  
Average (Drop lowest (0)): 16.33  
Average (Drop lowest (0) & highest (20)): 15.88
```

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

## Lab 6.2 (Challenge 1)

**You do not need to submit this challenge!** For this lab, you will need to create a new Visual Studio project that will contain your source code. Name this project “Lab06\_2\_XXXXXXXX”, replacing the XXXXXXXX with your PUNetID.

Determine whether you’d prefer to be paid \$1,000.00 a day for 25 days or a penny the first day, two pennies the second, four pennies the third day and so on, doubling the amount you made the previous day. There is no user input to this program.

**Sample output follow:**

```
*****
*                Loads O' Money                *
*****

  Day   Thousands   Doubling
-----
    1     1000.00     0.01
    2     1000.00     0.02

And so on until you reach the 25th day

    25     1000.00   25th doubling amount
-----
Total    25000.00   Whatever the total is
```

1. List each variable declaration necessary to store the data and information in your program. The variable name and type must be enough information to describe the information the variable holds.

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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.

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

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### Lab 6.3 (Challenge 2)

**You do not need to submit this challenge!** In mathematics, it is often useful to approximate the value of a function. The more terms in the approximation the better it is. Hyperbolic sine (*sinh*) can be approximated with the following formula:

$$\sinh x = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots = \sum_{n=0}^{\infty} \frac{x^{2n+1}}{(2n+1)!}$$

We cannot sum to infinity but we can use a computer to sum a large number of terms. Write some code that will approximate *sinh*, given a value for **x** and a maximum value for **n**. Both of these values should come from the user. Once you've approximated  $\sinh(x)$ , compare your calculated value to the result produced by the function `double sinh(double )` which is available from the `cmath` library that contains the function `pow ( )`.

Display to the user the approximated value of  $\sinh(x)$ , the result of the function `sinh`, and the difference between them.

<http://en.wikipedia.org/wiki/Sinh>

**Note:** These challenges make great exam study questions!