

Lab 3 - CMPS 1043, Computer Science I

Keyboard Arithmetic

Lesson objectives:

1. Practice of keyboard input and screen output
 - a. User prompts for input
 - b. Commented output for user
2. Various arithmetic problems
3. Transforming from `cout` to file output after debugging
4. Refresher on program documentation

1. Data can be provided to a program in 2 primary ways
 - a) Interactively through the keyboard
 - b) Through a data file

In lab 2 you used a file. This week we will practice keyboard input.

Type in the following program code in C++ then execute the code. (Remember `ctrl + F5`)
What happens? Why?

```
#include<iostream>

using namespace std;

int main( )
{
    int num;
    cin >> num;
    cout << "The number entered is " << num << "\n";
    return 0;
}
```

USER PROMPT: A user prompt is information displayed for the user giving instructions as to what they are to do.

You need to add a *user prompt* telling the user to type in a number. Add the following line to the program above. Insert it immediately following the "int num;" statement. Execute again.

```
cout << "Please type in an integer then hit the enter key.\n"
```

2. Arithmetic Operators: + - * / %

Let's practice with a variety of arithmetic operations using the value you type in for num.

- a. Print out 5 sequential integers, including your entered number in the middle. That is, if you type in 9, your program should print out 7 8 9 10 11
- b. Add a second `cout` statement after the one already in your program. Type the following code and execute the program again.

```
cout << num - 2 << num - 1 << num << num + 1 << num + 2 << endl;
```

What is wrong with this statement? Fix it.

3. Integer division: When dividing 2 integers, the result is ALWAYS an integer. Add the following command to your program. Execute and type in an ODD number.

```
cout << num<< " / 2 = " << num / 2 << endl;
```

If you want the actual decimal value, you must ensure that one of your values is real. Change the 2 in the division to 2.0 then execute again.

4. *Modulo (%)* is the remainder function. It is used only for integer division. Add the following command to your program. Type in a large number (e.g. 4672) for input.

```
cout << "The remainder of " << num<< " / 99 is " << num % 99 << endl;
```

LAB 3 – Assignment

Modify the program you have been working on to include the following.

1. Add header of comments containing required information (as specified in the previous labs). Add at least 3 comments in the body of the program.
2. Between the code you have already written and the "return" statement, add code to your program to accomplish the following tasks.
 - a. Prompt the user to enter 2 different numbers. Call them *Number1* and *Number2*. (Don't forget to declare the 2 new integers at the beginning of the program.)
 - b. Using output lines similar to those above, print a separate line for each of the following:
 - i. Number 1 + Number 2
 - ii. Number1 - Number 2
 - iii. Number 1 * Number 2
 - iv. Number 1 / Number 2
 - v. Number 1 % Number 2
3. Execute your program entering 35 as Number1 and 16 as Number2.
4. When the program is working correctly, change all cout statements to statements that will print to a file, as you learned in lab last week. Print out both the program code and the output file to turn no later than next week. SAVE your work before leaving the lab.