

# COSC 501

## Lab 4

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### **( 20 points) Program 1: Predefined Function**

Write a C++ program that calculates an absolute number, a power, a square root, rounding up, rounding down, and rounding to the nearest by calling predefined functions.

You must include 'cmath' to use mathematical functions. (#include <cmath>)

#### **List of functions**

- double abs (double x); // returns the absolute value of  $x$ :  $(|x|)$
- double pow (double b, double e); // returns  $b$  raised to the power  $e$ :  $(b^e)$
- double sqrt (double x); // returns the square root of  $x$ :  $(\sqrt{x})$
- double round (double x); // returns the integral value that is nearest to  $x$
- double ceil (double x); // returns  $x$  upward
- double floor (double x); // returns  $x$  downward

**Sample Output:** Red colored texts are user inputs. Other texts are the output of the program.

$|-21| = 21$

$2^3 = 8$

A square root of 16 = 4

Rounding up 3.5 = 4

Rounding down 3.5 = 3

Rounding 3.5 to the nearest integer = 4

## **( 40 points) Program 2: Overloading Function**

Write an overloaded function *max* that takes either two, three, or four parameters of type double and returns the largest of them.

You will use this main function to test your program.

```
int main()
{
    double result;
    result = max(10.0, 20.0);
    cout << "Max(10.0, 20.0) = " << result << endl;

    result = max(11.5, 21.2, 5.3);
    cout << "Max(11.5, 21.2, 5.3) = " << result << endl;

    result = max(1.8, 2.2, 1.7, 2.1);
    cout << "Max(1.8, 2.2, 1.7, 2.1) = " << result << endl;

    return 0;
}
```

**Sample Output:** Red colored texts are user inputs. Other texts are the output of the program.

Max(10.0, 20.0) = 20

Max(11.5, 21.2, 5.3) = 21.2

Max(1.8, 2.2, 1.7, 2.1) = 2.2

### **( 40 points) Program 3: Random Number Generator**

Write a C++ program that generates 10 random numbers between *min* and *max*. You should also write a function *getRand* that takes two parameters (*min* and *max*), and returns a random number between *min* and *max*. The program should ask users to enter *min* and *max* for generating a random number.

```
- int getRand(int min, int max);           // Declaration of a function getRand
```

**Sample Output:** Red colored texts are user inputs. Other texts are the output of the program.

Enter the min and max of the random number: 11 27

Generating 10 random numbers...

15 16 24 24 26 15 16 12 20 23

### **Submission:**

You should submit your source files (.cpp). Please name your files to include the lab number and program number, e.g. Lab0Program1.cpp. Also create a word or pdf document for the answers to the lab questions and screenshots of running result.