

CS 150 Lab 10

Functions

The objective of today's lab is to practice writing programs with functions.

- Be sure your output looks exactly like the specified output.
- Submit the completed project to CS150-02 Lab by Friday at 5pm.
- Follow the coding standards and add comments to your code!
- Complete these lab projects in order. Do not start Part B until you have completed Part A.
- Your projects are to be created in **PUNetIDLabsSecond**

Lab 9.1

Write a C++ program in a project called **10_1_Functions** that will contain the functions described below.

Part A:

Write a function named `printHeading` that accepts a string and prints a heading of the following form shown below. The function prototype is: `void printHeading (string);`

Output

```
*****  
* string  
*****
```

Executing the following program segment

```
void printHeading (string);  
  
int main()  
{  
    printHeading ("Coding Functions");  
  
    return EXIT_SUCCESS;  
}
```

Produces the result

Output

```
*****  
* Coding Functions  
*****  
Press any key to continue . . .
```

Show the instructor or TA your solution

Part B:

Add the function **absolute** to your program. The function accepts a double and returns the absolute value of the passed in double. The function prototype is:

```
double absolute (double);
```

Executing the following program segment

```
void printHeading (string);
double absolute (double);

int main()
{
    printHeading ("Coding Functions");
    cout << endl;

    printHeading ("Absolute Value");
    cout << endl;
    cout << "Absolute Value of -5.5 is " << absolute (-5.5) << endl;
    cout << "Absolute Value of 5.5 is " << absolute (5.5) << endl << endl;

    return EXIT_SUCCESS;
}
```

Produces the result

Output

```
*****
* Coding Functions
*****

*****
* Absolute Value
*****

Absolute Value of -5.5 is 5.5
Absolute Value of 5.5 is 5.5

Press any key to continue . . .
```

Show the instructor or TA your solution

Part C:

Add the function **isMultiple** to your program. The function accepts two integer values and returns true if the second value is a multiple of the first number. The function prototype is:

```
bool isMultiple (int, int);
```

Executing the following program segment

```
void printHeading (string);
double absolute (double);
bool isMultiple (int, int);

int main()
{
    printHeading ("Coding Functions");
    cout << endl;

    printHeading ("Absolute Value");
    cout << endl;
    cout << "Absolute Value of -5.5 is " << absolute (-5.5) << endl;
    cout << "Absolute Value of 5.5 is " << absolute (5.5) << endl << endl;

    printHeading ("Is 2 a multiple of 3?");
    cout << endl;
    if (isMultiple (3, 2))
    {
        cout << "Is a multiple" << endl << endl;
    }
    else
    {
        cout << "Is not a multiple" << endl << endl;
    }

    return EXIT_SUCCESS;
}
```

Produces the result

Output

```
*****
* Coding Functions
*****

*****
* Absolute Value
*****

Absolute Value of -5.5 is 5.5
Absolute Value of 5.5 is 5.5

*****
* Is 2 a multiple of 3?
*****

Is not a multiple

Press any key to continue . . .
```

Show the instructor or TA your solution

Part D:

Add the function **round** to your program. The function accepts a double and a number of digits to round the value to. The value passed back is the rounded double value. The function prototype is:

```
double round (double, int);
```

Executing the following program segment

```
void printHeading (string);
double absolute (double);
bool isMultiple (int, int);
double round (double, int);

int main()
{
    printHeading ("Coding Functions");
    cout << endl;

    printHeading ("Absolute Value");
    cout << endl;
    cout << "Absolute Value of -5.5 is " << absolute (-5.5) << endl;
    cout << "Absolute Value of 5.5 is " << absolute (5.5) << endl << endl;

    printHeading ("Is 2 a multiple of 3?");
    cout << endl;
    if (isMultiple (3, 2))
    {
        cout << "Is a multiple" << endl << endl;
    }
    else
    {
        cout << "Is not a multiple" << endl << endl;
    }

    printHeading ("Rounding a Value");
    cout << endl << "Rounding Value of 12.3456 to one places is "
        << round (12.3456, 1);
    cout << endl << "Rounding Value of 12.3456 to two places is "
        << round (12.3456, 2);
    cout << endl << "Rounding Value of 12.3456 to three places is "
        << round (12.3456, 3) << endl << endl;

    return EXIT_SUCCESS;
}
```

Produces the result

Output

```
*****  
* Coding Functions  
*****  
  
*****  
* Absolute Value  
*****  
  
Absolute Value of -5.5 is 5.5  
Absolute Value of 5.5 is 5.5  
  
*****  
* Is 2 a multiple of 3?  
*****  
  
Is not a multiple  
  
*****  
* Rounding a Value  
*****  
  
Rounding Value of 12.3456 to one places is 12.3  
Rounding Value of 12.3456 to two places is 12.35  
Rounding Value of 12.3456 to three places is 12.346  
  
Press any key to continue . . .
```

Optional Challenge1:

Add the function **isPrime** to your program. The function accepts an integer and returns true if the number passed in is prime; otherwise, false is returned. The function prototype is:

```
bool isPrime (int);
```

Add the function **printPrimeTable** to your program. The function accepts a positive integer and prints the number of primes (beginning with 2) passed to the function in a table of 5 per line. This function will need to call isPrime to determine whether a number is prime. The function prototype is:

```
void printPrimeTable (int);
```

As an example, a call to printPrimeTable (11); will print the following:

```
  2    3    5    7   11
 13   17   19   23   29
 31
```

Show the instructor or TA your solution

- 1) Your program is to compile without any errors or warnings.
- 2) Do not use any magic constants in your program. Define your constants before defining the rest of your program's variables.

Once your project is complete, place your solution **PUNetIDLabsSecond** into the CS150-02 Drop folder on grace. Your solution is to have ALL previous projects completely working and correct.