

## CS330: Programming Language Project (PLP) Assignments 5 & 6: Functions, parameters, and scope

Due: March 18, 2019

Being able to write functions that can be called more than once and sent different information each time is a huge part of most programming languages. However, there are a lot of variations in how functions are declared, where they are placed, how they accept parameters and how the function output is returned. Plus, you have to watch out for issues with scope and naming: some languages (e.g. Java) keep variables visible only inside of their own functions, while others (e.g. Perl) will have everything visible globally unless you use the keyword 'my'. In order to find out how your language handles these issues, answer the following questions and write code for each one that demonstrates the answers:

1. What is the syntax for declaring a function in your language? The syntax for declaring a function is 'return-type function-name(parameter1, parameter2, etc.)'

2. Are there any rules about where the function has to be placed in your code file so that it can run (i.e., before main, after main, in the same file, in the same folder, etc)? The function should be placed at the beginning of the program (before main) and should always be declared before being called.

3. Does your language support recursive functions? If so, write one. C++ supports recursive functions.

4. Can functions in your language accept multiple parameters? Can they be of different data types? Functions in C++ can accept multiple parameters of different data types.

5. Can functions in your language return multiple values at the same time? Functions in C++ can return multiple values at the same time. To return multiple values at the same time, use pointers, structures, or arrays. ([Source](#))

6. Declare a variable (say, x) in the main body of your program. Then declare a variable of the same name inside of a loop. Is there a conflict? Is the old variable overwritten or do you now have two variables of the same name? There is not a conflict. There are two variables of the same name - one inside the loop and one in main.

7. What if the other x is inside a function? Again, there are two variables.

8. Can you have variables that are globally accessible? What are the rules for creating them? C++ can have globally accessible variables. They are initialized automatically. If you have a variable of the same name locally, the local variable will take preference.

9. Are variables passed by value or by reference? (Hint: write a function that alters its input, but doesn't return it. Pass it a variable, and see if the alteration is visible in main after you call the function) Variables are passed by value unless you specifically use references in your code.

10. If you run this code (or the equivalent) in your language, what is the output? What does that tell you about how the language handles assignments? The below code will not run in C++ because the arrays are not assignable.

```
char [] a = {'c','a','t'}  
char [] b = {'d','o','g'}  
a=b  
b[1] = 'u'  
print a  
print b
```

As always, write out the answers to these questions as though you were writing a guide for a new learner.

Make your answers as clear as possible, and provide code that shows how you tested the questions and the results that you get.

Post your answers and code on GitHub and email me the link.