## Homework 3: Functions in C++

 $\operatorname{CS16}$  - Summer 2021

Due:	Thursday, July 15, 2021 (11:59 PM PDT)
Points:	75
Name:	
Homework buddy:	

- You may collaborate on this homework with **at most** one person, an optional "homework buddy."
- Submission instructions: All questions are to be written (either by hand or typed) *in the provided spaces* and turned in as a single PDF on Gradescope. In other words, you must edit this file directly! Reach out on Slack if you want some suggestions on how to do this. Do not copy and paste the text into a word processor; we will not accept this and your homework may not be graded. If you submit handwritten solutions, write legibly. We reserve the right to give 0 points to answers we cannot read.
- 1. (15 points) Write a **definition** for a void function called **check\_it(**) that takes 3 integer arguments and prints "YES" if the arguments are in ascending order. Otherwise, it returns "NO".

For example, check\_it(1, 2, 6) and check\_it(2, 2, 3) both return "YES", but check\_it(6, 6, 1) returns "NO".

2. (15 points) Write a **definition** for a void function called roll() that takes no arguments and prints a *random integer number* between 2 and 13 (inclusive) every time the function is called.

For example, if, in a program, you do this:

for (int k = 0; k < 5; k++) {
 roll();
}</pre>

You could get an output like this (note the newlines after each number). Assume your program already has included cstdlib and ctime libraries and has seeded the random number generator in the main() function. Just give the function definition for the answer.

3. (10 points) Consider the follow code snippet:

```
int x = 10;
while (x-- >= 3) {
    cout << x << " ";
    if (!(x % 3)) {
        cout << "Buzz! ";
        if ((x % 2) == 0) {
            cout << "Fizz!";
        }
    }
    else {
        cout << "..." << endl;
    }
}
```

a. (3 points) Write what this code will print out exactly.

b. (7 points) Explain step-by-step why the program prints out what it does.

4. (5 points) Explain the difference between these 2 snippets of code.

```
for (int i = 0; i < 10; i++) {
    cout << i;
}</pre>
```

int i; for (i = 0; i < 10; i++) { cout << i; }

5. (6 points) Consider the code below.

```
int a = 7, b = 9;
cout << "Here is ";
while (a++ % b != 0) {
    cout << a << " ";
    b += 2;
    a -= 2;
}
cout << endl;</pre>
```

a. (2 points) Write what this code will print exactly.

b. (4 points) How is the value of variable a changing? Show your work!

6. (15 points) Consider the following main() function.

```
int main() {
    int x = 10, y = 20, z = 30;
    shift(x, y, z);
    cout << x << " " << y << " " << z << endl;
    return 0;
}</pre>
```

The **body** of the **shift()** function is as follows.

```
{
    int temp;
    temp = var1;
    var1 = var2;
    var2 = var3;
    var3 = temp;
}
```

What will this program print for each of the following function declarations for shift(). Explain why!

```
a. (5 points) void shift(int var1, int var2, int &var3);
```

b. (5 points) void shift(int &var1, int &var2, int var3);

c. (5 points) void shift(int &var1, int &var2, int &var3);

7. (6 points) We talked about 3 concepts related to programmer-defined functions: (1) function declaration, (2) function definition, and (3) function call.

```
1 #include <iostream>
2
  using namespace std;
  bool isDivisibleBy(int a, int b);
3
4
5
  int main() {
       cout << "15 divisible by 5? " << isDivisibleBy(15, 5) << endl;</pre>
6
7
       return 0;
8
 }
9
10 bool isDivisibleBy(int a, int b) {
       return (a % b == 0);
11
12 }
```

- a. (2 points) List the line number(s) for the function declaration of isDivisibleBy().
- b. (2 points) List the line number(s) for the function definition of isDivisibleBy().
- c. (2 points) List the line number(s) for the function calls of isDivisibleBy().
- 8. (3 points) What is a flag in a program and what use is it? (Read Chapter 3.)