

# Homework 3: Functions in C++

CS16 - Winter 2021

---

<b>Due:</b>	Thursday, January 28, 2021 (11:59 PM PST)
<b>Points:</b>	75
<b>Name:</b>	-----
<b>Homework buddy:</b>	-----

---

- 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. If you submit handwritten solutions write legibly. We reserve the right to give 0 points to answers we cannot read. When you submit your answer on Gradescope, **be sure to select which portions of your answer correspond to which problem** and clearly mark on the page itself which problem you are answering. We reserve the right to give 0 points to submissions that fail to do this.

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)` returns “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();  
}
```

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.

```
4  
2  
11  
5  
7
```

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;  
}
```

-----

```
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;
```

- 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;  
}
```

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;
3  bool isDivisibleBy(int a, int b);
4
5  int main() {
6      cout << "15 divisible by 5? " << isDivisibleBy(15, 5) << endl;
7      return 0;
8  }
9
10 bool isDivisibleBy(int a, int b) {
11     return (a % b == 0);
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.)