

# MTH 4300: Algorithms, Computers, and Programming II

Spring 2025

Midterm Review

## 1 TRUE OR FALSE

1. The command to compile and rename a file is: `g++ main.cpp -o main`
2. the literal "apple" is an lvalue
3. the float data type can **only** store positive integers
4. while loops are used when you need a program to loop, and the number of times it will loop is determined at run time.
5. Is this syntax correct: `int matrix[3][3] = {1, 2, 3},{4, 5, 6},{7, 8, 9};`
6. Base case for recursion is always required
7. Arrays are technically pointers
8. `new` is used to mark an item as never seen before
9. Passing by reference allows you to avoid copying an object, improving performance, but returning by value ensures the caller receives a new copy of the object.
10. All variables on the heap must be referenced using pointers

## 2 SHORT ANSWER

1. What is the downside of storing variables in the function call stack?
2. What is the terminal command to create a new folder?
3. Fix the function below:

```
void my_function(int param1, param2)
{
    cout<<"hello"<<endl;
    return 7;
}
```

4. initialization list must be used if one of your attributes is a reference variable.
5. What does the sizeof function return ?
6. Whats a disadvantage of recursion?
7. Consider the function signature **void func(int alpha, int beta=9, int gamma)**, is the syntax correct ?
8. Whats a dangling pointer and how is it caused.
9. does `int* const ptr;` make the address stored or the content of the address stored const?
10. The variable `int* pointer = &x;` is stored on the heap or the stack?

### 3 CODING(midterm will only have 2 questions here)

1. Write a c++ class to describe a toaster. Make sure to include at least 3 attributes(set to private), 3 methods(set to public), and a constructor(set to public). Write a main function and create 2 objects in the main. Figure out a way to print one of your attributes in the main by calling one of your methods.
2. Write a main function that creates a 5 by 5, 2d integer array(on the heap or stack whatever you prefer). Then prompt the user to enter a row number x, and a value y. For row x, fill up each entry with (y + column number).
3. What does the following code print:

```
int x = 10;
int* y = &x;
x=17;
*y=22;
cout<<x<<endl;
```

4. What does the following code print:

```
1  #include<iostream>
2
3  using namespace std;
4
5  void func(int n);
6
7  int main()
8  {
9      func(10);
10     return 0;
11 }
12
13
14
15 void func(int n)
16 {
17     if(n==0)
18     {
19         cout<<endl;
20         return;
21     }
22
23     cout<<"#";
24     func(n-1);
25     cout<<"%";
26 }
```

## 4 SOLUTIONS

### 4.1 TRUE OR FALSE

1. true
2. false
3. false
4. true
5. false
6. true
7. true
8. false
9. true
10. true

### 4.2 SHORT ANSWER

1. it can get full and you are not allowed to resize it
2. mkdir
3.

```
int my_function(int param1,int param2)
{
    cout<<"hello"<<endl;
    return 7;
}
```
4. yes
5. the number of bytes for the type of the input variable
6. It can cause a stack overflow, too much overhead for simpler problems
7. default arguments are incorrect
8. When a pointer points to memory that has been freed. It is caused after you use the delete operator and forget to set the ptr to nullptr.
9. address stored
10. stack

### 4.3 CODING(files below located inside this repo)

1. review\_coding-question1.cpp
2. review\_coding-question2.cpp
3. review\_coding-question3.cpp
4. review\_coding-question4.cpp