

**CSCE A211**  
**Midterm Exam #1**

**Name:** \_\_\_\_\_

Please write neatly and show as much of your work as possible for partial credit. The exam is open book and open notes. You can also use a computer for accessing an e-book, reviewing your notes or programs or material posted on the website, but not for entering and compiling programs or searching/communicating on the Internet.

**1. (18 pts) Short Answer.** Provide brief (1-3 sentence) answers to the following:

a) Program 1 requires processing large amounts of raw video in real time while Program 2 requires customized course content (e.g. from Blackboard) to be displayed by the program. It should run on Unix, Windows, and Macs. If C++ and Java are your choices, which would you use for each program? Justify your choice.

b) Why doesn't the following C++ code generate a random number between 0 and 1?

```
double d = (rand() % 1000) / 1000;
```

c) Describe one new feature that is supported in the C++11 standard.

d) You have compiled Foo.java on a Unix system that normally accepts input from the keyboard. How would you run the program so that the input to the program comes from the file named "data.txt"?

e) What is a breakpoint and what would you use one for?

f) What is the difference in memory allocation for `int a[10]` in C++ and `int[] a=new int[10]` in Java?

## 2. (20 pts) Find the Bugs

All of the following code snippets have at least one bug or problem. **Identify each one and fix the bug.** Each one really has a problem, there are no trick questions here! Assume the necessary headers/includes/imports are in place to make a working program.

a) The following C++ code inputs a CString and copies it to another CString:

```
char s1[20], s2[10];
cin >> s1;
strcpy(s2, s1);
```

b) The following function in C++ should generate different pseudorandom numbers each time the function is called.

```
int rollTwoDice()
{
    srand(time(NULL));
    int diceroll = rand() % 6 + rand() % 6 + 2;
    return diceroll;
}
```

c) The following Java code should input an age and then a street address.

```
int age;
String address;
Scanner kbd = new Scanner(System.in);
age = kbd.nextInt();
address = kbd.nextLine();
```

d) The following Java code should search the array “arr” and set the Boolean variable “found” to true if 7 is in the array and set the Boolean variable “found” to false if 7 is not in the array.

```
boolean found=true;
for (int i = 0; i < arr.length; i++)
{
    if (arr[i]==7)
        found = true;
    else
        found = false;
}
if (found)
    System.out.println("Found 7!");
else
    System.out.println("7 not found.");
```

### 3. (10 pts) Risky Recursion

Here is a C++ function that ignores input until the user types the letter 'q'. At that point imagine the program does some computation and then exits.

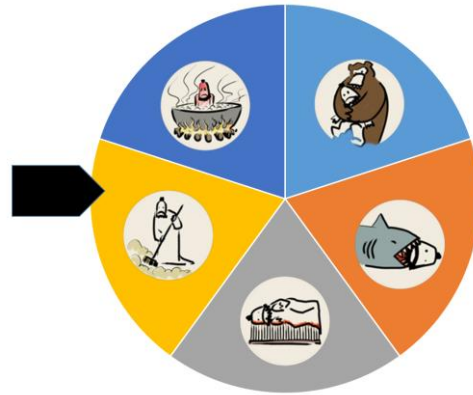
```
void doSomething()  
{  
    int a[999999];  
    char c;  
    cin >> c;  
    if (c=='q')  
    {  
        // imagine the program does something  
        // amazingly interestingly here with array a  
        return;  
    }  
    else  
        doSomething();  
}
```

a) If this function is called what could happen to make the program crash, and why would it crash?

b) Rewrite the code to avoid the problem.

#### 4. (22 pts) The Wheel of Punishment

Justice is meted in your neighborhood by spinning the Wheel of Punishment. The following C++ program simulates the wheel to dispense e-justice.



```
#include <iostream>
#include <string>
#include <ctime>
#include <cstdlib>
using namespace std;

string punishment[] = {"Bed of nails",
    "Boiled in oil",
    "Eaten by shark",
    "Mauled by bear",
    "Community service"};
int numPunishments = 5;
int punishmentIndex;

void spinWheelOfPunishment()
{
    punishmentIndex = rand() % numPunishments;
}

void outputPunishment()
{
    cout << "As punishment for your crime you are hereby sentenced to:";
    cout << punishment[punishmentIndex] << endl;
}

int main()
{
    srand(time(NULL));
    cout << "Welcome to the Wheel of Punishment 1.0." << endl;
    spinWheelOfPunishment();
    outputPunishment();
    return 0;
}
```

Re-write this program so it **does not use any global variables**. You must retain the two functions, but modify them to receive/pass/return variables as needed. You can use shorthand to write your code (e.g. `string punishment[] = {"Bed ... etc... "};`) so you don't have to write so much, as long as it is clear what your shorthand maps to.

Use the following blank page if you can't fit it on this page.



## 5. (10 pts) Reference Parameters

Given the following code in main:

```
int main()
{
    int x=4, y=3;
    swap(x,y);
    cout << x << " " << y << endl;
    x=11, y=22;
    swap(x,y);
    cout << x << " " << y << endl;
    return 0 ;
}
```

Write the function “swap” so that the variables are swapped in the caller’s scope. The output of the program above with the swap function completed should be:

```
3 4
22 11
```

**6. (20 pts) Java Top Contacts.** The following code creates a small phone book. An array is used to store a list of names and another array is used to store the phone numbers that go with each name. For example, Michael Myers’ phone number is 333-8000 and Ash Williams’ phone number is 333-2323.

Write the Java method **lookupName** so the code properly looks up and returns the phone number for the input target name. **lookupName** should return a blank string if the name is not in the phone book.

```
Scanner kbd = new Scanner(System.in);
String[] names = {"Michael Myers", "Ash Williams",
                 "Jack Torrance", "Freddy Krueger"};
String[] phoneNumbers = {"333-8000", "333-2323",
                         "333-6150", "339-7970"};
System.out.println("Enter name to look up.");
String targetName = kbd.nextLine();
String targetPhone = lookupName(targetName, names, phoneNumbers);
System.out.println("The phone number is " + targetPhone);
```

(blank page if you need more space for any problems)