

## CSCE 2004 - Practice Final

Online course evaluation: Please take a few minutes to fill in the online evaluations for this course. Your feedback is very important to the instructors of this class, and will be used to help improve the course for next year. You should have received an email from the Provost's office, or you can go here: <https://courseval.uark.edu/etw/>

Check online grades: Most of the lab and homework scores should be posted on our website. Click the Grades tab on the left side of the website and login to check your grades to make sure they were entered correctly. There should be very few '-1' grades remaining to be filled in. Bring any inconsistencies to the TA's attention.

Practice final exam questions: The remainder of this lab has sample final exam questions. You are encouraged to work on these questions to practice for the final exam. We will post the solutions by dead day so you can check your answers before the final exam. If you finish early, you can review the practice midterm materials to make sure you still remember everything, or you can work on your final homework assignment while you are in the lab.

## Data Types and Boolean Expressions

Consider the following variable declarations:

```
int catHeight = 6;
int dogHeight = 7;
string dogName = "Rover";
string catName = "Sylvester";
float catWeight = 15.0;
float dogWeight = 20.0;
bool dogRabies = true;
bool catRabies = false;
```

**[5 points]** Which Boolean expression is equivalent to the statement: "the cat has rabies and does not weigh 20 pounds or less"?

- a) (catRabies != true) && (catWeight >= 20)
- b) (catWeight < 20.0) || (catRabies == true)
- c) !(catRabies == true) && (catWeight <= 20)
- d) !(catRabies == false) && (catWeight > 20.0)
- e) None of the above

**[5 points]** Which Boolean expression is equivalent to the statement: “the dog does not weigh less than the cat and neither the cat nor the dog has rabies”?

- a) `!(dogWeight < catWeight) && !((catRabies == true) && (dogRabies == true))`
- b) `!(dogWeight >= catWeight) && ((catRabies == true) || (dogRabies == true))`
- c) `(dogWeight >= catWeight) && ((catRabies == false) && (dogRabies == false))`
- d) `(dogWeight != catWeight) && ((catRabies == true) && (dogRabies == true))`
- e) None of the above

**[5 points]** Which Boolean expression is equivalent to the statement: “the cat height and the dog height are not 10”?

- a) `!(catHeight == 10) || !(dogHeight == 10)`
- b) `(catHeight != 10) && (dogHeight >= 10)`
- c) `!((catHeight != 10) && (dogHeight != 10))`
- d) `((catHeight != 10) && (dogHeight != 10))`
- e) None of the above

### Tracing Loops

Consider the following C++ program:

```
int main()
{
    int Sum = 0;
    int Num = 1;
    while (Sum < 10)
    {
        Sum = Sum + Num;
        Num = Num + 1;
    }
    cout << "Sum= " << Sum << ", "
         << "Num= " << Num << endl;
    return 0;
}
```

**[5 points]** How many times will the program execute the code inside the loop?

- a) 0
- b) 4
- c) 5
- d) 10
- e) None of the above

**[5 points]** What will the output of this program be?

- a) Sum=0, Num=1
- b) Sum=6, Num=4
- c) Sum=10, Num=4
- d) Sum=10, Num=5
- e) None of the above

Consider the following C++ program:

```
int main()  
{  
    int Control = 2;  
    int Sum = 0;  
    while (Control < 5)  
    {  
        for (int Inner = 1; Inner <= 2; Inner++)  
        {  
            Sum = Sum + Control;  
        }  
        Control = Control + Control;  
        cout << "Control=" << Control << ", "  
             << "Sum=" << Sum << endl;  
    }  
    cout << "Control=" << Control << ", "  
         << "Sum=" << Sum << endl;  
    return 0;  
}
```

**[5 points]** What will the output of this program be?

- a) Control=4, Sum=4  
Control=8, Sum=12  
Control=8, Sum=12
- b) Control=2, Sum=4  
Control=4, Sum=12  
Control=8, Sum=12
- c) Control=2, Sum=2  
Control=4, Sum=2
- d) Control=4, Sum=4  
Control=4, Sum=4
- e) None of the above

**[5 points]** Which of the following C++ statements would have the same effect as the line "for (int Inner = 1; Inner <= 2; Inner++)"?

- a) int Inner = 1; while (Inner < 3)
- b) for (int Inner = 2; Inner > 0; Inner++)
- c) int Count = 2; while (Count-1 > 0)
- d) for (int Count = 0; Count < 2; Count++)
- e) None of the above

### Array Declaration and Use

**[5 points]** Which one of the following C++ declarations will create a 2-dimensional integer array with 10 rows and 5 columns?

- a) int[10][5] array;
- b) int array[5][10];
- c) int array[10][5];
- d) int[5][10] array;
- e) None of the above

**[10 points]** In the space below, write a C++ function that takes a 2-dimensional integer array with 10 rows and 5 columns as an input and returns the max value of that array and its location within the array as reference parameters.

```
void FindMax(int array[10][5],
             int &max_val, int &max_row, int &max_col)
{
    max_val = array[0][0];
    for(int i=0; i<10; i++)
    {
        for(int j=0; j<5; j++)
        {
            if(array[i][j] > max_val)
            {
                max_val = array[i][j];
                max_row = i;
                max_col = j;
            }
        }
    }
}
```

## Functions and Parameters

Consider the following C++ code:

```
double modifyValue(double Value)
{
    Value = Value * 2.0;
    return Value;
}

double modifyResult(double Result)
{
    Result = Result / 3.0;
    if (Result < 10)
        return Result;
    else
        return modifyValue(Result);
}

int main()
{
    double Value, Result;
    Value = 42;
    Result = modifyValue(Value);
    cout << Value << " " << Result << endl; // Position A
    Result = 36;
    Value = modifyResult(Result);
    cout << Value << " " << Result << endl; // Position B
    return 0;
}
```

**[5 points]** What values will be printed at position A?

- a) 42.0 42.0
- b) 42.0 24.0
- c) 84.0 84.0
- d) 42.0 84.0**
- e) None of the above

**[5 points]** What values will be printed at position B?

- a) 24.0 36.0**
- b) 42.0 36.0
- c) 12.0 36.0
- d) 36.0 84.0
- e) None of the above

## File Input/Output

Assume that the following information is stored in a text file called "data.txt".

```
1 student1 3.5
2 student2 0.6
3 student3 4.0
4 student4 2.2
5 student5 2.3
6 student6 3.8
7 student7 3.5
8 student8 3.1
9 student9 1.5
10 student10 3.0
11 student11 2.0
12 student12 1.6
13 student13 3.1
14 student14 3.9
15 student15 2.6
16 student16 4.0
17 student17 3.3
18 student18 2.6
```

**[10 points]** Fill in the blanks in the following C++ code so it will read the text file above, and find a student with a specific ID and print their name and GPA.

```
#include <iostream>
#include <fstream>
#include <string>
using namespace std;

int main()
{
    string idToLookFor;
    string id;
    string name;
    string gpa;

    cout << "Enter student ID: ";

    cin >> idToLookFor;

    ifstream din;

    din.open( "data.txt" );

    if ( din.fail() )
        cout << "Error. Unable to open file.\n";
    else
    {
        while((din >> id) && (id != idToLookFor))
            din >> name >> gpa;

        if (id == idToLookFor)
        {
            din >> name >> gpa ;
            cout << "Student name: " << name
                 << " GPA: " << gpa << endl;
        }
        else
            cout << "The student was not found." << endl;

        din.close();
    }
    return 0;
}
```

## Arrays and Functions

Consider the following C++ function that is intended to count the number of negative values in an array. Remember that zero is not negative. If the array contains {0, 2, -1, 4, -3, -7} the count is three.

```
int Process(int Array[], const int array_size)
{
    int Count = 0;
    // Iterate //
    {
        // Compare //
        Count++;
    }
    return Count;
}
```

**[5 points]** What statement should be in the place of // Iterate to process the array?

- a) for (int i = 0; i < 10; i++)
- b) for (int i = 1; i <= Array; i++)
- c) for (int i = 0; i < array\_size; i++)
- d) for (int i = 0; Array[i] < array\_size; i++)
- e) None of the above

**[5 points]** What should be in the place of // Compare to correctly increment count?

- a) if (i < 0)
- b) if (Array[i] > strlen(Array))
- c) while (Array[i] < 0)
- d) if (Array[i] >= 0)
- e) if (Array[i] < 0)

## Using Classes

Consider the following C++ code:

```
class Account
{
public:
    Account() { balance = 100; }
    int getBalance();
    int updateBalance(int Amount);

private:
    int balance;
};
```



```
int Account::getBalance()
{
    return balance;
}

int Account::updateBalance(int amount)
{
    balance += amount;
    return amount;
}

int main()
{
    Account mySavings;
    cout << "Balance A: " << mySavings.getBalance() << endl;
    int Amount = mySavings.updateBalance(10);
    cout << "Balance B: " << mySavings.getBalance() << endl;
    return 0;
}
```

**[5 points]** What value will be printed after "Balance A" when the program runs?

- a) 10
- b) 100**
- c) 101
- d) 110
- e) None of the above

**[5 points]** What value will be printed after "Balance B" when the program runs?

- a) 10
- b) 100
- c) 101
- d) 110**
- e) None of the above

Given the following C++ class definition:

```
const int MAXSTUDENTS = 100;

class Group
{
public:
    Group ();
    bool FillInfo (const char Filename[]);
    int GetNumStudents () const;
    void Print() const;
    bool ChangeGPA (const char Name[], const float GPA);

private:
    void SetNumStudents( const int Num);
    string Names[MAXSTUDENTS];
    float GPAs[MAXSTUDENTS];
    int UAIDs[MAXSTUDENTS];
    int NumStudents;
};
```

Given the following C++ variable definitions:

```
Group RowingClub;
int MyUAID;
int NumStudents;
```

**[5 points]** Which of the following C++ statements are syntactically correct and use method return values correctly?

**Correct** / Incorrect:      NumStudents = RowingClub.GetNumStudents();

Correct / **Incorrect**:      RowingClub.FillInfo("Data.txt");

Correct / **Incorrect**:      MyUAID = RowingClub.UAIDs[7];

**Correct** / Incorrect:      if (RowingClub.ChangeGPA ("Susan", 4.0))  
                                cout << "Perfect\n";

Correct / **Incorrect**:      RowingClub.SetNumStudents (15);

## Using Pointers

Consider the following C++ code:

```
int main()
{
    int a = 6;
    int b = 5;
    int c = 10;

    int *aptr = &a;
    int *bptr = &b;
    int *cptr = &c;

    cout << "Value of a: " << a << endl;
    cout << "Value of b: " << *bptr << endl;
    cout << "Value of c: " << c << endl;

    *aptr = *aptr + *cptr;
    c = c - *bptr;

    cout << "Value of a: " << a << endl;
    cout << "Value of b: " << b << endl;
    cout << "Value of c: " << *cptr << endl;

    return 0;
}
```

**[5 points]** What will this program output when the program is executed?

Value of a: 6  
Value of b: 5  
Value of c: 10  
Value of a: 16  
Value of b: 5  
Value of c: 5