

CMPSC16 Midterm-I
Spring 2017
4/26/2017

This exam is closed book, closed notes. However, you may use one 8.5" x 11" piece of paper with notes on both sides. Write your name on the your notes paper. No calculators or phones are allowed in the exam. **Write all your answers on the answer sheet. However, all exam sheets, notes paper and scratch paper must be turned in at the end of the exam.**

By signing your name below, you are asserting that all work on this exam is yours alone, and that you will not provide any information to anyone else taking the exam. In addition, you are agreeing that you will not discuss any part of this exam with anyone who is not currently taking the exam in this room until after the exam has been returned to you. This includes posting any information about this exam on Piazza or any other social media. Discussing any aspect of this exam with anyone outside of this room constitutes a violation of the academic integrity agreement for CMPSC16.

Signature: _____

Name (please print clearly): _____

Umail address: _____@umail.ucsb.edu

Perm number: _____

Your exam hall: _____

Name of student to your left _____

Name of student to your right _____

You have 75 minutes to complete this exam. Work to maximize points. A hint for allocating your time: if a question is worth 10 points, spend no more than 5 minutes on it if a question is worth 20 points, spend no more than 10 minutes on it etc. If you don't know the answer to a problem, move on and come back later. Most importantly, stay calm. You can do this!

WRITE ALL YOUR ANSWERS IN THE PROVIDED ANSWER SHEET!

**DO NOT OPEN THIS EXAM UNTIL YOU ARE INSTRUCTED TO DO SO.
GOOD LUCK!**

Problem 1 [20 points] The Basics (10 minutes)

Briefly answer each of the following questions in the provided answer sheet.

1. [2 pts] Assume you have a correct and complete C++ program stored in the file `hello.cpp`. Which of the following is the outcome of running the command: `$g++ hello.cpp`, at the command line.

SELECT THE SINGLE BEST ANSWER.

- A. The program is executed to produce an output
- B. The program is compiled to produce an executable
- C. The program is opened for editing
- D. None of the above

2. [2 pts] Which of the following is true about the given C++ statement:

```
cout >> I love oranges and apples ;
```

SELECT THE SINGLE BEST ANSWER

- A. It has a logic error that results in an incorrect output at runtime
- B. It has a syntax error that results in a warning message at compile-time
- C. It has a syntax error that results in an error message at compile-time
- D. None of the above

3. [2 pts] What is the output of the following code. Assume it is embedded in a correct and complete C++ program

```
int x = 4, y = 6;
bool v, w;
v = (x < y);
w = (x == 4);
x++;
cout << x << " " <<y << " " << v << " " << w << endl;
```

4. [2 pts] What is the output of the following code:

```
int x = 10;
while ( x > 0) {
    cout << x << " ";
    x = x - 5;
}
```

5. [2 pts] What is the result (true or false) of each of the following Boolean expressions in C++, given

that: **x = 4, y = 0**

- a. `!(x - 10)`
- b. `(x < y) && (y == 0)`

6. [2 pts] Write a unix command to create a new directory named “labs” in your home directory. Assume you are on the command line in the CSIL servers, and in your home directory

7. [2 pts] Write a unix command to copy all the files from the directory `~/lab01/` to `~/test/`. Assume that both directories exist and that you have read and write permissions on both directories.

8. [2pts] Suppose we have a correct and complete program named `myprog` where the main starts with the line:

```
int main(int argc, char *argv[])
```

and the program is run with the following command line: `./myprog hen duck cow`

- a. [1 pt] What is the value of `argc`?
- b. [1 pt] What is the value of `argv[2]`?

9. [2pts] Which of the following is NOT included in the **declaration** of a function? *SELECT THE SINGLE BEST ANSWER*

- A. The body of the function
- B. The data types of the formal parameters of the function
- C. The data type of the value returned by the function
- D. The name of the function

10. [2pts] What is the output of the following program?

```
#include <iostream>
using namespace std;
void swap(int a, int b){
    cout<< "Inside swap"<<endl;
    int tmp = a;
    a = b;
    b = tmp;
    cout<< a << " " << b<< endl;
}

int main(){
    int x= 10, y=20;
    cout<< "Before swap" <<endl;
    cout<< x<< " " <<y<<endl;
    swap(x, y);
    cout<< "After swap" <<endl;
    cout<< x<< " " <<y<<endl;
}
```

Problem 2 [10 points]: Write the definition of a function `starU` that takes two arguments: an integer width and an integer height. The function should return a string that when printed to standard output produces the letter 'U' using ASCII art, just like you created the other letters in lab 2. If width is less than 3 or height is less than 2, you should return an empty string.

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Below are example outputs for different calls to the starU program. The cout statements are intended to show the behavior of the starU function. Assume each statement is embedded in a correct and complete C++ program.

```
cout<<starU(3,3);
```

```
* *  
* *  
***
```

```
cout<<starU(3,5);
```

```
* *  
* *  
* *  
* *  
***
```

```
cout<<starU(5,3);
```

```
* *  
* *  
*****
```

```
cout<<starU(2,5);
```

```
//No output produced
```

Problem 3 [10 points]: Control flow statements in C++ (10 minutes)

For each group of the C++ statements below, do the following activities in the provided answer sheet:

- Circle infinite if it results in an infinite loop, or finite if it NOT an infinite loop
- Check the the no output column () if there is no output
- If the code has output, put it in the box. Note: if the output will be infinite, just write the output of the first three times, then put three dots like this: ...

1. [2 pts]

```
for (int i=4; i>0; i--) {  
    cout<<i<< " ";  
}
```

Name: _____

2. [2pts]

```
for( int i = 0; i < 3; i++){
    for (int j = i; j>=0 ; j--) {
        cout<<"*";
    }
    cout<<endl;
}
```

3. [2 pts]

```
int i = 3;
while(true) {
    if(i<0){
        break;
    }
    cout<< "*";
    i--;
}
```

4. [2 pts]

```
for(int i = 1; i < 3; i++) {
    for(int j = 1; j < 3; j++){
        if(j <= i){
            cout<< "*" ;
        }
    }
    cout<< endl;
}
```

5. [2 pts]

```
for(int i = 0; ; i++) {
    cout<<"*"<<endl;
}
```

Name: _____

Problem 4 [10 points]: Complete the code to calculate a series (similar to code written in lab01) (5 minutes)

Write a function named `sumSeries` that takes a parameter 'n' and returns the value infinite series: $s = 1 - (1/2) + (1/4) - (1/8) + \dots$ computed up to the nth term. For example, if $n = 0$, then $s = 1$, if $n = 1$, $s = 1 - (1/2)$. The function should return 0 if the value of n is negative. You may use the pow function, see the usage below:

```
double c = pow(a, b); // c= a^b
```

Name: _____

Scratch Paper