

CSci 1113

Midterm 1

Name: _____

Student ID: _____

Instructions: Please pick and answer any 7 of the 8 problems for a total of 70 points. If you answer more than 7 problems, only the first 7 will be graded. The time limit is 50 minutes. Please write your answers in the space provided. The exam is open book and notes. You may use electronic devices to ONLY look at either an e-book version or electronic notes. You may not use the internet, compiler or any other outside resources. (If you are typing on your keyboard/input device for anything other than ctrl-F to find words in the e-book or notes, this is probably not acceptable.)

Problem (1) [10 points] Suppose you have four variables with values: `x1`, `y1`, `x2`, and `y2`. Write C++ code that finds the distance between these two points and stores this value in a variable called: `dist`. (This can be done on a single line of code. More lines are okay too...)

Problem (2) [10 points] What are the values of these variables after the end of this code segment: a, b, c, d, and e.

```
int a=3, b=4, c=8, d=2, e=5;
if(a++ == b) {
    e = c+d;
}
if(a++ == b) {
    b--;
    if(e%d == 0) {
        b -= 2;
    } else if (c - a < b) {
        c = -3;
    }
    d = a;
}
if(a + d < c) {
    d=7;
    if(d > a) {
        a = b+d;
    }
}
```

Problem (3) [10 points] Write a single loop that prints the sequence of numbers shown below (with spaces between). The only conditional you can use is in the loop condition (i.e. no if-statements for any of these answers).

(1): 0 2 4 6 8 10 12 14 16 18

(2): 0 1 3 7 15 31 63

(3): 22 7 2

(4): 3 6 2 4

Problem (4) [10 points] Pretend you make paper clips for a living. You currently make and sell 100 paper clips a day (you always sell all your paper clips because they are so awesome). Every 100 paper clips you sell increases your production by 5% the next day. Both the next day production and the percentage increase are rounded down to the nearest integer. For example, if you make 262 paper clips in one day, you would get a 10% increase (not 13.1) and the next day you would make 288 (not 288.2) paper clips.

Write code that finds out how many days pass before you make a total of one million paper clips. For example, in 1 day you can make 100, in 2 days you can make a total of 205 (including the ones made from day 1), in 3 days you can make a total of 315, ...

Problem (5) [10 points] What is the output of this code?

```
int main()
{
    for(int i=0; i<7;i++)
    {
        for(int j=0; j<=i; j++)
        {
            if(i==j || i+j==6)
            {
                cout << "X";
            }
            else
            {
                cout << ".";
            }
        }
        cout << endl;
    }
}
```

Problem (6) [10 points] Show what each variable stores, given the following input and code segments:

(1) Input: My name is Sue

Code:

```
string a;  
cin >> a;
```

(2) Input: My name is Sue

Code:

```
string a;  
getline(cin, a);
```

(3) Input: My name is Sue

Code:

```
string a, b;  
cin >> a;  
getline(cin, b);
```

(4) Input: 3 + 4

Code:

```
string a;  
cin >> a;
```

(5) Input: 3 + 4

Code:

```
string a;  
getline(cin, a);
```

(6) Input: 3 + 4

Code:

```
string a, b;  
cin >> a;  
getline(cin, b);
```

(7) Input: hi!

Code:

```
string a;  
cin >> a;
```

(8) Input: hi!

Code:

```
string a;  
getline(cin, a);
```

(9) Input: hi!

Code:

```
string a, b;  
cin >> a;  
getline(cin, b);
```

Problem (7) [10 points] Find 3 possible places for errors in the following code (assume no issues with parts not shown, such as `#include`). Assume no user-defined global variables exist. Explain specifically what causes the error and whether it is a syntax, runtime or logic error.

```
int main()
{
    int sum, lim, i;
    cout << "Enter a number: ";
    cin >> lim;
    for(i=0; i < lim; i++);
    {
        sum = i + sum;
    }
    cout << "Inclusive sum from 1 to lim is: " << sum;
}
```

Problem (8) [10 points] Write C++ code to add or subtract two numbers. This program must work for both real numbers and imaginary numbers. Imaginary numbers will be denoted by an “i” after the number. There will be only two numbers with a single subtraction or addition symbol between them and a period at the end of the sentence.

Example 1 input: 3.5+4.

Example 1 output: 7.5 + 0i

Example 2 input: 3.5i+4i.

Example 2 output: 0 + 7.5i

Example 3 input: 3.5i+4.

Example 3 output: 4 + 3.5i

Example 4 input: 3.5+4i.

Example 4 output: 3.5 + 4i

Example 5 input: 3.5-4.

Example 5 output: -0.5 + 0i

Example 6 input: 3.5i-4i.

Example 6 output: 0 + -0.5i