

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] Write C++ code to find **d** in the following mathematical equation:

$$d = \max(x^n, \frac{987}{543})$$

Assume variables **x** and **n** have been declared and given values. **You may not use any existing functions, i.e. `max()` or `pow()`.**

Problem (2) [10 points] Show all integers of x for which the following if-statements are true. If the range of integers is infinite, show the six closest to the value 0 (with a ... indicating that the pattern continues).

(a) `if(x < 0 || x > 0)`

(b) `if(x > 2 && x < 10 && x != 5)`

(c) `if(!(x == 4 && x == 6))`

(d) `if(true || (x/10 > 32 && x%2 == 0)`
`|| (2 < x && sin(x) > 0)`
`|| (x*x*x + 3*x + 4 == x*x - 2*x))`

(e) `if(x%2 == x%6 && x > 0)`

Problem (3) [10 points] What is the output of the following code:

```
int main() {
    int x = 1;
    for(int i=0; i < 5; i++) {
        if(x < 5) {
            x *=3;
        }
        else if(x > 5) {
            x /= 2;
        }
        if(x%2 == x%3) {
            x = 5;
        }
        cout << x << " ";
    }
}
```

Problem (4) [10 points] Abdelrahman's beard grows 0.3cm throughout the week. On Saturdays, he measures how long his beard is and does one of the three things: (1) if the beard is over 2cm, he always shaves it to 0.5 cm, otherwise (2) 50% of the time he will trim off 0.1cm and (3) the other 50% of the time he will do nothing with his beard. Write a C++ program that takes as input Abdelrahman's beard length at the start of the week and outputs his beard length after Saturday's actions.

Example 1 input: 1.8

Example 1 output: 0.5

Example 2 input: 1.0

Example 2 output: 1.2

Example 3 input: 1.0

Example 3 output: 1.3

Problem (5) [10 points] Write C++ code to make a square of X's based on some variable `size` which stores the length of the square's side. The inside of the square should be spaces. You may assume `size` is positive. Assume the variable `size` has been declared and stores a value.

Example 1: `size = 3`

Output:

```
XXX
X X
XXX
```

Example 2: `size = 4`

Output:

```
XXXX
X X
X X
XXXX
```

Problem (6) [10 points] Write C++ code that lets users enter positive integers until the number 0 is entered (you may assume at least one number is entered before they input 0). When this happens, display the smallest integer before zero.

Example 1 input: 7 5 4 8 3 9 5 7 99887 0

Example 1 output: 3

Example 2 input: 5 2 0

Example 2 output: 2

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. The code is supposed to average 10 distances.

```
double sum = 0;
int i = 1;
if(i < 10) {
    double dist = 7;
    cout << "Next distance? ";
    cin >> dist;
    sum + dist;
}
cout << "Average distance = " << sum/10;
```

Problem (8) [10 points] The user will input two heights using imperial units shown in the format below (first input in example 1 is “5 feet 8 inches”). Write C++ code that tells whether the first or second height is the largest. You may assume the inches will be less than 12, and both feet and inches will not be negative. In the case of a tie, you can output whatever you want. (If you are unfamiliar with these units, 1 foot = 12 inches.)

Example 1 input: 5'8" 4'6"

Example 1 output: First person is largest

Example 2 input: 1'2" 3'4"

Example 2 output: Second person is largest