### **CS 2150 Exam 1**

Name
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There are 6 pages to this exam. Once the exam starts, please make sure you have all the pages. Questions are worth different amounts of points.

#### If you do not bubble in this first page properly, you will not receive credit for the exam!

exam is CLOSED text book, closed-notes, closed-calculator, closed-cell phone, closed-coer, closed-neighbor, etc. Questions are worth different amounts, so be sure to look over	
the questions and plan your time accordingly. Please sign the honor pledge below.	

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### Page 2: C++

1. [3 points] Give two compelling reasons why we create header files for C++ classes.

2. [3 points] The #define/#ifndef/#endif commands used in C++ header to prevent include loops – explain *why* it prevents include loops.

3. [3 points] Explain what pass by constant reference is, and why we would use it.

4. [3 points] Write a C++ code segment that creates a dynamic memory hole. We are looking for just the code itself; don't bother with #include, using namespace std;, etc.

### Page 3: More C++

5. [3 points] Consider the two statements int x[3], y[3]; and x=y;. What is the result of this code? Why?

6. [3 points] What is the difference between the copy constructor and the operator=() method? When is each called?

7. [3 points] Other than syntax, what are the three primary differences between pointers and references?

8. [3 points] Why were references added to the C++ language? Pointers were already available, so why bother adding references as well?

# Page 4: Lists

9. [3 points] Give two advantages of implementing a list using arrays, and two advantages implementing a list using linked lists (either singly-linked or doubly-linked, your choice).

10. [3 points] Why do template compilation errors give such horrendous error messages?

11. [3 points] What is an abstract data type, and why do we use them?

12. [3 points] What are the running times for the three primary stack operations in an array-based implementation?

### Page 5: Numbers

Consider a machine that **only has 16-bit values**, for *both* ints and floats. The caveat is that ints are stored in little-endian format, while floats are stored in big-endian format. Both ints and floats are encoded as discussed in class (two's complement for ints and IEEE 754 for floats). Consider a union variable named 'foo' that has two fields: an int field i and a float field f.

13. [4 points] What is the hexadecimal value stored in memory if the code bar.i = 205 is executed? Recall that it is stored in 16-bit little-endian format!

14. [3 points] We have not specified the mantissa and exponent size for this 16-bit floating point type. What are reasonable values for these? Why? Remember that one bit must be reserved for the sign bit. Lastly, what is your exponent offset?

15. [5 points] What value is printed if the code cout << bar.f << endl is executed? You will need to decode your floating point number based on your responses to the previous question. As a FIRST step, what is the big-endian hexadecimal value that you will be decoding?

## Page 6: UNIX

16. [3 points] List 6 GDB commands, and (briefly!) explain each one.

17. [3 points] Explain what the UNIX chmod command does. Give an example of its usage.

18. [3 points] List 3 additional UNIX command-line commands that were gone over in the tutorials, and (briefly!) explain what each one does. You may not list the basic file system commands (ls, mkdir, cp, mv, cd, rm, and pwd).

19. [3 points] There are four UNIX pipes: <, >, >>, and |. Briefly explain what each one does.