

CS 2150 Exam 1

Name _____

You **MUST** write your e-mail ID on **EACH** page and bubble in your userid at the bottom of this first page. And put your name on the top of this page, too.

If you are still writing when “pens down” is called, your exam will be ripped up and not graded – even if you are still writing to fill in the bubble form. So please do that first. Sorry to have to be strict on this!

Other than bubbling in your userid at the bottom of this page, please do not write in the footer section of this page.

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!

Answers for the short-answer questions should not exceed about 20 words; if your answer is too long (say, more than 30 words), you will get a zero for that question!

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

*You step in the stream,
But the water has moved on.
This page is not here.*

(the bubble footer is automatically inserted into this space)

Page 4: Numbers

9. [4 points] Consider a two's complement integer of n bits. What is the largest and smallest value that this value can hold? Express each of these as a formula in terms of n .
10. [4 points] Consider a mini-float, which encodes just like a IEEE 754 floating point number except that it has only 5 bits for the exponent and 10 bits for the mantissa. What is the exponent offset? What is the highest value that can be stored in this type? You may leave your answer as a power of 2. And you may round slightly on the mantissa.
11. [4 points] Convert 79_{12} to base 5. Show your work!

Page 6: Arrays and Big-Oh

14. [4 points] Prove that $n^2 \in \Omega(n)$.
15. [4 points] Why do we like big Theta over big Oh and big Omega? What do we think of little Theta?
16. [4 points] Consider the C++ code `char a[3][4] = { {'a','b','c','d'}, {'e','f','g','h'}, {'i','j','k','l'} };`. Draw a diagram of what memory looks like after this call.