

## CS 2150 Exam 1, spring 2017

**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 3: Lists**

5. [3 points] In lab 1 you implemented a doubly linked list (each node had a pointer to its next and previous nodes). Imagine a singly linked list with only pointers to the next node in the list; the List object only has a pointer to the head of the list and not to the tail. Give one pro and one con to having this list instead.
6. [6 points] You can implement a list with either an array or a linked list. Give one pro and one con of each implementation. Note that you can't use the same reason twice! So if *A* is faster than *B*, you can't *also* say that *B* is slower than *A*.

	Advantage	Disadvantage
array		
linked list		

7. [3 points] Imagine that you were given two stacks, and *nothing else*. How might you implement a queue using just those two stacks? You only need to describe, briefly and in English, how you would handle `enqueue()` and `dequeue()`.

**Page 4: Numbers**

8. [3 points] Convert the following 48-bit binary value, shown in big-Endian, to little-Endian hexadecimal: 0000 1101 1111 0000 0000 0110 0000 1101 0101 1100 1100 0001
9. [3 points] What is the maximum and minimum value of a 24-bit two's complement signed integer? You may leave your answer as a (simple) equation.
10. [6 points] Convert  $-13.375$  ( $-13\frac{3}{8}$ ) into *little-Endian* IEEE 754 floating point notation.



Page 6: No questions here

This page unintentionally left blank.

MISS LENHART COULDN'T BE HERE TODAY, SO SHE ASKED ME TO SUBSTITUTE.

MATH

MR. MUNROE

I'VE PUT OUT YOUR TESTS. PLEASE GET STARTED.

MR. MUNROE, MISS LENHART NEVER TAUGHT US THIS.

THAT'S BECAUSE MISS LENHART DOESN'T UNDERSTAND HOW IMPORTANT CERTAIN KINDS OF MATH ARE.

THIS MATERIAL IS MORE VITAL THAN ANYTHING YOU'VE EVER LEARNED

NO BUTS.

BUT THIS JUST LOOKS --

BUT --

THIS IS A MATTER OF LIFE AND DEATH.

Name: \_\_\_\_\_

- The velociraptor spots you 40 meters away and attacks, accelerating at  $4 \text{ m/s}^2$  up to its top speed of  $25 \text{ m/s}$ . When it spots you, you begin to flee, quickly reaching your top speed of  $6 \text{ m/s}$ . How far can you get before you're caught and devoured?
- You are at the center of a  $20\text{m}$  equilateral triangle with a raptor at each corner. The top raptor has a wounded leg and is limited to a top speed of  $10 \text{ m/s}$ .

(Not to scale)

The raptors will run toward you. At what angle should you run to maximize the time you stay alive?

- Raptors can open doors, but they are slowed by them. Using the floor plan on the next page, plot a route through the building, assuming raptors take 5 minutes to open the first door and halve the time for each subsequent door. Remember, raptors run at  $10 \text{ m/s}$  and they do not know fear.