

## CS 2150 Exam 2

**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 8 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!**

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.

---

---

---

---

---

*Serious error.  
All shortcuts have disappeared.  
Screen. Mind. Both are blank.*

(the bubble footer is automatically inserted into this space)

**Page 2: Older stuffs**

1. [3 points] What problem occurs when implementing a queue via an array (we aren't looking for the array-fills-up answer here)? How is this problem solved?
2. [3 points] When is the copy constructor invoked, and when is the `operator=()` method invoked?
3. [3 points] What is the purpose of the destructor?
4. [3 points] What is the largest value of an `int` type on a 32-bit machine? You may leave your answer as a formula (as long as the parts of the formula are only numbers).



**Page 4: Hashes**

8. [3 points] What is the running time of a hash table that uses double hashing as the collision resolution strategy?
  
  
  
  
  
  
  
  
  
  
9. [3 points] Provide a good hash function for ASCII strings.
  
  
  
  
  
  
  
  
  
  
10. [3 points] Which is better between a large load factor and a small load factor? Why?
  
  
  
  
  
  
  
  
  
  
11. [3 points] Give two reasons why a hash table size should be prime. Are both reasons required for it to work correctly (not necessarily quickly)?

**Page 5: IBCM**

12. [12 points] What IBCM code that will compute the product of two numbers. We are only looking for the relevant code; don't worry about input and output (you can assume that the values to multiply together are in some variables). You should leave your answer in opcode format, which means your targets (variables, jump targets, etc.) should be strings, and not addresses.

**Page 6: x86**

13. [3 points] List all the steps in the caller's prologue for the C calling convention.

14. [3 points] List all the steps in the caller's epilogue for the C calling convention.

15. [3 points] List all the steps in the callee's prologue for the C calling convention.

16. [3 points] List all the steps in the callee's epilogue for the C calling convention.

**Page 7: Miscellaneous**

17. [3 points] Define *amortized* as it relates to big-theta analysis.
18. [6 points] Prove that  $3n$  is  $O(n^2)$  (that's big-Oh, not big-Theta).
19. [3 points] What does it mean when an algorithm is described as being little-theta of  $n$ ?

Page 8: Comics!

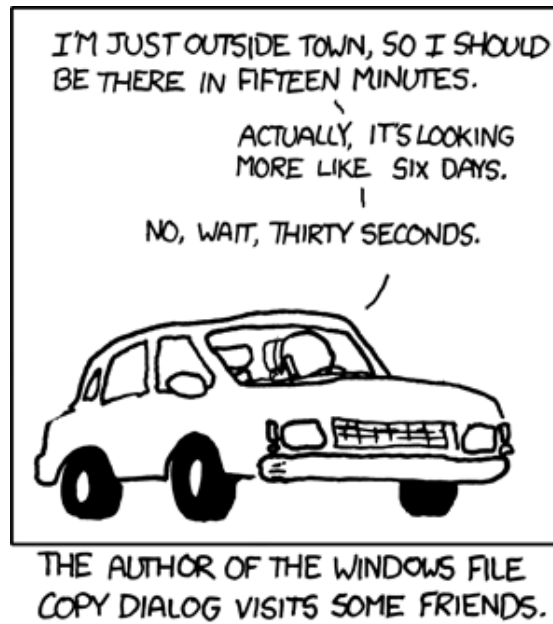


Figure 1: <http://xkcd.com/612/>



Figure 2: <http://xkcd.com/619/>