

Final Exam Review

CS 2308
Spring 2015

Jill Seaman

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Final Exam

- 251 (10am section): Friday 5/8 11am-1:30pm
- 252 (11am section): Monday 5/11 8am-10:30am
- Closed book, closed notes, clean desk
- Comprehensive (covers entire course)
- 30% of your final grade
- I recommend using a pencil (and eraser)
- I will bring scratch paper.
- No calculators, no headphones/earphones²

Exam Format

- 200 points total (10 or 11 pages):
 - * Writing programs/functions/classes/code
 - * Multiple choice
 - * Tracing code
 - * Demonstrating search/sort algorithms
 - * Finding errors in code
 - * Short answer

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Example Problems

See the lecture notes titled:

Final Exam Exercises

on the website

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Chapters 1-7 Review

- Know how to program with arrays and functions
- Passing parameters by reference (and value)
- Passing arrays to functions
- Overloaded functions
- Default arguments
- Be able to process arrays
 - Be able to find the minimum/maximum value!
 - See review exercises
- Be able to find errors in code

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Ch.8: Searching and Sorting Arrays

- Searching
 - Linear Search
 - Binary Search
- Sorting
 - Bubble Sort
 - Selection Sort
- See review exercises:
 - Describe algorithms in English
 - Sample exercises to demonstrate algorithms

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Analysis of Algorithms: efficiency

- Efficiency
 - Growth rate functions, which are faster/slower
 - Use big-O notation
 - Efficiency of
 - ▶ searching/sorting
 - ▶ array access and traversal
 - ▶ linked list operations
 - See the Final Exam Review Exercises for good coverage on this

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Ch 9: Pointers

- Pointer variables: how to define + initialize
- Address of (&) and Dereferencing (*) operators
- Pointers and arrays
 - * an array variable is the address of its first element
 - * $\text{array}[\text{index}] = *(\text{array} + \text{index})$
- Dynamic memory allocation
 - * new + delete operators
 - * allocate new arrays (Programming Assignment 3)
- Pointers as parameters (call by reference, arrays)
- Using pointers with linked lists

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Ch. 10: Strings and Things

- Char functions: isalpha, isdigit, islower, tolower, ...
- C-strings:
 - representation:
 - ✦ char array
 - ✦ terminated by null character ('\0')
 - library functions: strlen, strcpy, strcmp
- Predefined string class:
 - initializing string objects.
 - operations: =, <<, >>, relational ops, [n]
 - member functions: length, size, append, at
- Be able to write functions that process string⁹ data.

Ch 11: Structures

- Structures:
 - Definition (new data type) and variables
 - How to access members (dot operator)
 - Operations (which are valid)
 - Arrays of structures
 - Pointers to structures (-> operator):
s->x (*s).x *(s.x)
 - Dynamic memory allocation
 - Use of structures in linked lists (Nodes)

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Ch.13+14: Classes

- Procedural programming vs object oriented programming
- Encapsulation, Data hiding, Interface
- Fundamentals of classes and objects:
 - Members: variables and functions
 - private vs public, access rules
 - declaration and implementation of classes
 - ▶ defining member functions
 - ▶ overloaded operators
 - constructors and destructors
 - copy constructor (default)

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Ch.13+14: Classes

- Fundamentals of classes and objects (cont.):
 - inline member function definitions
 - instance variables vs static variables
 - defining instances of a class (objects)
 - arrays of objects, initialization
- Pointers to objects
 - how to declare, assign
 - using ->
 - dynamic allocation of objects
 - when destructor function is called
 - the "this" pointer

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C++ Programming on Linux

- Basic shell commands, know how to use
- edit, compile, run (nano, g++, a.out)
- Compiling multiple files:
 - How to split up code, what goes where
 - g++ a.cpp b.cpp
 - separate compilation
 - g++ -c a.cpp
 - g++ -c b.cpp
 - g++ a.o b.o
 - makefile: understand the ones used for the assignments, know how to use them

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Ch. 17: Linked Lists

- How to define a linked list (node declaration and head pointer definition).
- Adding a node (insert at front or append)
- Insert or delete node from the middle of a list
 - how to advance 2 pointers together
 - be able to set pointers in general case
- How to traverse a linked list to
 - display it, calculate some value
 - find minimum/maximum
 - find last node
- Arrays vs Linked Lists

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Ch. 18: Stacks and Queues

- Know what ADT, LIFO and FIFO mean
- Know the 4 basic operations of each data type:

pop	enqueue
push	dequeue
isEmpty	isEmpty
isFull	isFull
- Understand how to use a stack to perform algorithm done in PA7 (matching brackets)
- Be able to show contents of stack or queue after a series of operations (see Final Exam Review Exercises)

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Office Hours after last class day

Day	Date	Time
M	5/4	3:30-4:30pm
T	5/5	1:30-3:00pm
Th	5/7	9:30-10:30am
F	5/8	9:30-10:30am
M	5/11	12:30-1:30pm
Th	5/14	11:00-noon
		and by appt.

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How to Study

- Start with the topics from this set of slides (Final Exam Review).
- Use the regular semester lectures to make sure you understand the topics.
- Use the textbook to make sure you understand the lectures about the topics.
- **Do** the review exercises on the Final Exam Exercises slides. Practice!!
- Go over the exams and assignment solutions (take the exams again, quiz yourself).
- Discuss with others!