Final Exam Review

CS 2308
Spring 2015
Jill Seaman

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/earphones

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

Example Problems

See the lecture notes titled:

Final Exam Exercises

on the website
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

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

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

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
  - array[index] = *(array + 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
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 string 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)

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)

Ch.13+14: Classes (cont.)

- Fundamentals of classes and objects:
  - 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
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

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

Ch. 18: Stacks and Queues

- Know what ADT, LIFO and FIFO mean
- Know the 4 basic operations of each data type:
  
<table>
<thead>
<tr>
<th>pop</th>
<th>enqueue</th>
</tr>
</thead>
<tbody>
<tr>
<td>push</td>
<td>dequeue</td>
</tr>
<tr>
<td>isEmpty</td>
<td>isEmpty</td>
</tr>
<tr>
<td>isFull</td>
<td>isFull</td>
</tr>
</tbody>
</table>

- 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)

Office Hours
after last class day

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>5/4</td>
<td>3:30-4:30pm</td>
</tr>
<tr>
<td>T</td>
<td>5/5</td>
<td>1:30-3:00pm</td>
</tr>
<tr>
<td>Th</td>
<td>5/7</td>
<td>9:30-10:30am</td>
</tr>
<tr>
<td>F</td>
<td>5/8</td>
<td>9:30-10:30am</td>
</tr>
<tr>
<td>M</td>
<td>5/11</td>
<td>12:30-1:30pm</td>
</tr>
<tr>
<td>Th</td>
<td>5/14</td>
<td>11:00-noon</td>
</tr>
</tbody>
</table>

and by appt.
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!