

# Exam 1 Review

CS 2308  
Spring 2014

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# Exam 1

- Mon, February 24
- In class, closed book, closed notes, clean desk
- 20% of your final grade
- 80 minutes to complete it
- I recommend using a pencil (and eraser)
- All writing will be done on the test paper I will hand out.
- No calculators.

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# Exam Format

- 100 points total
  - Writing programs/functions/code
  - Multiple choice
  - Fill-in-the-blank/short answer
  - Tracing code (show what is the output)
  - Demonstrating the search/sort algorithms

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# C++ Programming on Linux

- What is Linux
- Linux file system
- Basic shell commands
- Basic file editing (nano, etc.)

pwd	more/less/cat
ls	cp
cd	mv
mkdir	rm
rmdir	

- edit, compile, run
- know how to use the commands

nano
g++
./a.out

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## Chapters 1-7 Review

- Know how to program with arrays and functions.
- Passing parameters by reference and by value
- Passing arrays to functions, processing arrays
- Partially filled arrays
- Understand Programming Assignment 1

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## Ch 11: Structured Data

- Structures:
  - Definition (new data type)
  - Variable definitions
  - How to access members (fields)
  - Operations (which are valid)
  - Arrays of structures
  - Structures as function args
- Understand Programming Assignment 2

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## Ch.8: Searching and Sorting Arrays

- Searching
  - Linear Search
  - Binary Search
- Sorting
  - Bubble Sort
  - Selection Sort
- Efficiency
  - Growth rate functions: which are faster/slower
  - Efficiency of each searching/sorting algorithm

You **will not** need to know the code  
--but I may ask you to implement linear search

You **will** need to be able to demonstrate the algorithms  
--see exercises at end

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## Ch 9: Pointers

- Address operator (&)
- Pointer variables: how to define (data type)
- Dereferencing operator (\*)
- Pointers and arrays
  - \* an array variable is the address of its first element
  - \*  $\text{array}[\text{index}] = *(\text{array} + \text{index})$
- Pointer arithmetic (if ptr points to a var of type d):
  - \*  $\text{ptr} + n = \text{address in ptr} + n * \text{sizeof}(d)$
- Initializing Pointers

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## Ch 9: Pointers, cont.

- Comparing pointers
- Pointers as function parameters
  - \* Pass by reference using pointers as parameters
  - \* Pointers used as parameters accepting arrays as arguments
- Dynamic memory allocation
  - \* new operator
  - \* new with arrays
  - \* delete
  - \* return pointers from functions

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## Example Programming Problem

Write a function that accepts an array of integers and the size of the array and prints out a table listing how many values in the array fall in each of the following ranges:

less than 50  
50 to 59  
60 to 69  
70 to 84  
85 to 99  
over 100

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## Example Tracing Problem

What will the EXACT output of the following program be?

```
int main () {
    int *ptr1, *ptr2;
    int fool;

    fool = 42;
    ptr1 = &fool;
    *ptr1 = 13;
    ptr2 = ptr1;

    cout << "fool - " << fool << endl;
    cout << "*ptr1 - " << *ptr1 << endl;
    cout << "*ptr2 - " << *ptr2 << endl;

    int x[] = {1,2,3};
    ptr1 = &x[1];
    *ptr2 = *(x+1);

    cout << endl;
    cout << "*ptr1 - " << *ptr1 << endl;
    cout << "*ptr2 - " << *ptr2 << endl;
}
```

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## Binary Search Example

The target of your search is 42. Given the following list of integers, record the values of first, last, and middle during a binary search. Assume the following numbers are in an array.

1 7 8 14 20 42 55 67 78 101 112 122 170 179 190

Repeat the exercise with a target of 82

first	0	0	4
last	14	6	6
middle	7	3	5

first	0	8	8	8	9
last	14	14	10	8	8
middle	7	11	9	8	

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## Sorting Example

Use the following array for both questions:

11	8	14	7	12	18	2	17
0	1	2	3	4	5	6	7

Show the contents of the array after 2 passes of the selection sort

Show the contents of the array after 2 passes of the bubble sort

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## How to Study

- Review the slides
  - \* understand all the concepts, quiz yourself
- Use the book to help understand the slides
  - \* there will be no questions over material (or code) that is in the book but not on the slides
- Review programming assignments (fix yours!)
  - \* get printouts of solutions in my office
- Try some exercises from the book
- Practice, practice, practice
- Get some sleep

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