Exam 1 Review

CS 2308
Fall 2012
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Exam 1

- Wed, Oct. 3 and Thurs, Oct. 4
- 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.

Exam Format

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

Chapters 1-7 Review

- Know how to program with arrays and functions
- Passing parameters by reference
- Passing arrays to functions
- Understand Programming Assignment 1
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
See exercises at end for the others

Ch 11: Structured Data

- Structures:
  - Definition (new data type)
  - Variable definitions
  - How to access members (fields)
  - Operations (which are valid)
  - Arrays of structures
  - Nested structures
  - Structures as function args, return values

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
  - array[index] = *(array + index)
- Pointer arithmetic (if ptr points to a var of type d):
  - ptr + n = address in ptr + n * sizeof(d)
- Initializing Pointers

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 (watch outs)
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

Example Tracing Problem

What will the EXACT output of the following program be?

```cpp
int main () {
  int *ptr1, *ptr2;
  int foo1, foo2 = 13;
  foo1 = 42;
  ptr1 = &foo1;
  ptr2 = ptr1;
  cout << "*ptr1 - " << *ptr1 << endl;
  cout << "foo1 - " << foo1 << endl;
  cout << "*ptr2 - " << *ptr2 << endl;
  *ptr1 = 100;
  *ptr2 = 200;
  cout << endl;
  cout << "*ptr2 - " << *ptr2 << endl;
  cout << "what? " << foo1 % 10 << endl;
  return EXIT_SUCCESS;
}
```

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

<table>
<thead>
<tr>
<th>first</th>
<th>0 0 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>last</td>
<td>14 6 6</td>
</tr>
<tr>
<td>middle</td>
<td>7 3 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>first</th>
<th>0 8 8 8 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>last</td>
<td>14 14 10 8 8</td>
</tr>
<tr>
<td>middle</td>
<td>7 11 9 8</td>
</tr>
</tbody>
</table>

Sorting

Example

Use the following array for both questions:

<table>
<thead>
<tr>
<th>11</th>
<th>8</th>
<th>14</th>
<th>7</th>
<th>12</th>
<th>18</th>
<th>2</th>
<th>17</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

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
How to Study

- Review the slides
  - understand all the concepts
- 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 assignments + solutions
- Try some exercises from the book
- Practice, practice, practice
- Get some sleep