

Exam 2 Review

CS 1428
Spring 2019

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Exam 2

- Thursday, April 18
- In class, closed book, closed notes, clean desk
- 12.5% of your final grade
- 80 minutes to complete it
- Bring your ID card!!!!
- Bring a number 2 pencil! (and eraser)
- NO: calculators or cell phones.
- NO: headphones/earbuds.

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Exam Format

- 100 Points total
 - ▶ 50 points: 25 multiple choice and T/F (scantron form)
 - ▶ 50 points: writing code on the test paper
 - ➔ programs, functions and individual statements
- Tasks:
 - ▶ Tracing code (what is the output)
 - ▶ Finding errors in code
 - ▶ Demonstrate general knowledge about C++ and programming
 - ▶ Programming (writing code, like in the PAs)

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Content from Textbook

Units 4 through 6:

- Chapter 5: 5.2-12
- Chapter 6: 6.1-5, 7-10,13
- Chapter 7: 7.1-4, 6 and 8

Primarily loops, arrays, and functions

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Loops

- while loop
 - ▶ general purpose
- do-while
 - ▶ body always done once
 - ▶ good for menus, repeating a process
- for loop
 - ▶ init; test; update
 - ▶ all are optional
- Which loops are good for which situations

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Loops

- Using a while loop for input validation
- Counters/count controlled loop
- Keeping a running total
- Sentinel controlled loop
- Nested loops
- Reading data from a file of unknown length
 - ▶ while (fin >> number)
- Infinite loops

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Arrays

- Array declaration/definition:
 - ▶ `int list[10];`
 - ▶ size declarator must be a constant (in the C++ standard)
- Array elements
 - ▶ `list[i]`
 - ▶ range of subscripts
 - ▶ types
- Array initialization:
 - ▶ `int list[] = {6,7,8};`

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Arrays

- Processing arrays
 - ▶ input and output
 - ▶ sum, average
 - ▶ finding max, min (and index of which one)
 - ▶ counting values that pass a test
 - ▶ array assignment (copy)
- Lack of bounds checking

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Functions

- Function definition
 - name, return type, parameter list, body
- Function call
 - name, argument list
- Function prototype, when it is required
- Function parameters and arguments
 - Understand how they work

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Functions

- The return statement
 - returning a value from a function
 - calling a function that returns a value
- Pass by value
- Pass by reference
- Scope and Lifetime
 - local and global variables
 - parameters
 - global constants

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Functions and Arrays

- Passing array **elements** to functions
 - parameter type matches element type
- Passing **entire** arrays to functions
 - parameter type is an array (no size declarator)
 - separate int parameter for size (usually)
 - argument is name of the array (no brackets)
 - arrays are ALWAYS passed by reference

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Software Development Process

- Top Down Design
 - Break tasks into subtasks
 - Make a hierarchy of tasks
- Incremental Development
 - Implement one piece at a time
- Testing
 - Test cases: input values and expected output
- Debugging
 - Strategy: output values of variables
 - Strategy: output literals to trace execution path

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Sample problem: multiple choice

- What is output by the following statements?

A)

B)

C)

D)

```
int list[] = {8,10,3,55,1,22,3,17};
int x = 10;
int i = 3;

while (i < 8) {
    int t = list[i];
    if (t < 10) {
        x = 7;
    } else if (t < 20) {
        x++;
    } else {
        x--;
    }
    i = i+3;
}
cout << "x = " << x << endl;
```

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Sample problem: Programming

The formula for the volume of a sphere is

$$A = \frac{4}{3}\pi r^3$$

where π is 3.14159 and r is the radius of the sphere. Write a function named `volume` that accepts a radius as an argument. The function should return the volume of a sphere having that radius. Demonstrate the function by calling it in a loop in the main function that displays a table of volumes of circles with radius values 1 through 10. Your function should work properly if the radius has a fractional part (i.e. 5.89).

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How to study

- Review the slides (Units 4 - 6, TDD, Programming)
 - understand all the concepts, **quiz yourself**
- Use Revel to help understand the slides
 - there will be no questions over material that is in Revel but not on the slides
- Review programming assignments (fix yours!)
 - get old assignments or solutions up front or in my office
- Review and redo the Squarecap and Revel questions
- Practice, practice, practice! Write code! Sleep!

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