

# Test 3 Review

CS 1428  
Spring 2020

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# Test 3

- Thursday April 23, ~3:30-4:50
- Online (Canvas)
- Open book, open notes, open lecture slides
- 10% of your final grade
- 70 minutes to complete it (from when you start)
- NO: communication/collaboration with others
- NO: searching the internet
- NO: using apps other than to access notes

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# Test Format

- 100 Points total
  - ▶ 50 points: 16 multiple choice type questions
  - ▶ 50 points: writing code in a text window
    - ➔ individual statements or a function
- You will be unable to go back to previous questions
- Tasks:
  - ▶ Tracing code and/or explaining coding errors
  - ▶ Demonstrating general knowledge about C++ and programming (application)
  - ▶ Programming (NOT graded for style!)

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# Content from Textbook/REVEL

Units 5 and 6:

Functions:

- Chapter 6: 6.1-5, 6.7-10, 6.13

Arrays:

- Chapter 7: 7.1-5, 7.8

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## Content from Slides

Units 5 and 6:

- Unit 5: Arrays
- Unit 6: Functions
- Top Down Design
- Programming

These are on the class website in PDF form

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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

(see the video on Canvas>Modules and pdfs on class website)

- 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: tracing output

- How many times will b++ be executed?

```
int list [] = {1,11,25,8,15,22,9};
int a=8, b=2;
for (int i=0; i<5; i++) {
    if (list[i]>10)
        a++;
    if (list[i]<10)
        b++;
}
cout << "a " << a << endl;
cout << "b " << b << endl;
```

A) 0      B) 1      C) 2      D) 3      E) 4      F) 5

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## Sample problem: Programming

The formula for the volume of a sphere is

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

where  $\pi$  is 3.14159 and  $r$  is the radius of the sphere.

A. Write a complete function definition for a function named `volume` that accepts a radius as an argument. The function should return the volume of a sphere having that radius.

B. Demonstrate the function by writing a loop that would go in the main function that displays a table of volumes of circles with radius values 1 through 10. You must call the function in your answer.

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## How to study

- Review the slides (Units 5 - 6, TDD, Programming)
  - understand all the concepts, **quiz yourself**
- Use Revel to help understand the slides
- Review programming assignments
  - assignment 5 and 6 solutions are on Canvas > Files
- Review/redo the Squarecap and Revel questions
- Do some of the programming challenges!
- Practice, practice, practice! Write code! Sleep!

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