Test 3 Review

CS 1428
Fall 2019

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Test 3

- Friday November 15
- In class, closed book, closed notes, clean desk
- 10% of your final grade
- 50 minutes to complete it
- Bring your ID card!!!!
- Bring a pencil! (and eraser)
- NO: calculators or cell phones.
- NO: headphones/earbuds.

Test Format

- 100 Points total
  - 50 points: 12-16 multiple choice (scantron form)
  - 50 points: writing code on the test paper

    ➡ program and/or individual statements
- Tasks:
  - Tracing code (what is the output)
  - Demonstrate general knowledge about C++ and programming
  - Programming (NOT graded for style!)

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

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

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};`

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

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

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

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

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

Sample problem: what is output?

- What is the output of the following statements?

```
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)
```
a 4
b 3
```

B)
```
a 12
b 5
```

C)
```
a 3
b 2
```

D)
```
a 11
b 4
```

Sample problem: Programming

The formula for the volume of a sphere is

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

where π 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.

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 will be up front
- Review/redo the Squarecap and Revel questions
- Do some of the programming challenges!
- Practice, practice, practice! Write code! Sleep!