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.

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)

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
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

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

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: multiple choice

- What is output by the following statements?

```
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;
```

A) x = 10

B) x = 7

C) x = 8

D) x = 6

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.

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).

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!