10-0: **Debugging**

- Your code is misbehaving. What do you do?

    - What is the first step for debugging?

10-1: **Debugging**

- Step I:

    - Reproduce the bug!
    - Find a method that consistently displays the unwanted/unexpected behavior
    - Find the *smallest possible* case that displays the problem
    - If necessary, change your code (#ifdefs, comments) to make it as simple as possible while still showing the problem

10-2: **Debugging**

- Step II:

    - Determine the "edges" of the bug
    - That is, under what conditions does the bug appear? Disappear?

10-3: **Debugging**

- Step III:

    - Once you know exactly when & where the bug appears, you should have a good idea about where in the code the problem shows up
    - This is not where the problem *is*, necessarily, just where the problem is *seen*
    - Time to break out the tools

10-4: **Using the tools**

- Breakpoints, call stacks, watches

- Looking through the callstack

- Breakpoints on data changes

10-5: **Examples**

- Debuging Example 1

10-6: **Examples**

- Debuging Example 1

    - Overwriting data by going past bounds of an array

10-7: **Examples**

- Debugging Example 2

10-8: **Examples**

- Debugging Example 2
    - Overwritng "this" pointer

10-9: **Examples**

- Debuging Example 3

10-10: **Examples**

- Debuging Example 3
    - Interpreting the data as the wrong type

10-11: **Examples**

- Debuging Example 4

10-12: **Examples**

- Debuging Example 4
    - Maintaining a pointer to data on the stack

10-13: **Examples**

- Debuging Example 5

10-14: **Examples**

- Debuging Example 5
    - Destructor without copy constructor
        - Rule of 3:
            - Constructor
            - Copy Constructor
            - Copy Assignment Operator
        - If you have one, you probably need all three ...

10-15: **Examples**

- Tank example
    - No tanks can move ... why?

10-16: **Examples**

- Checking for collisions
    - Array of tanks
    - Check each tank for collisions with all other tanks
    - No tank can move

10-17: **Examples**

- Checking for collisions
  - Array of tanks
  - Check each tank for collisions with all other tanks
  - Each tank collides with itself

10-18: **Examples**