Testing & Debugging

- When writing programs, they often do not never work correctly the first time due to errors in the code.

- How this usually goes…
  - Code the program — often better to think about it first, before you start typing
  - Type in your carefully thought out Java program
  - Attempt to run the program
  - Get an error. Correct it.
  - Repeat the previous two steps until the program runs correctly.

Errors

- An error in a program is called a *bug*
- Eliminating errors is called *debugging*
- What kinds of errors will I get?
    - Syntax / Compiler errors
    - Runtime errors
    - Logic errors

Syntax Errors

- Grammatical mistakes in a program
    - The grammatical rules for writing a program are very strict
    - These rules are called the **syntax** of the programming language
- The compiler catches syntax errors and displays an error message
- Examples:
    - Using a period where a comma is expected
    - Missing semicolon
    - Too many or too few { } braces

Runtime Errors

- Errors that are detected when your program is running, but not during compilation
- When detected, the computer terminates your program and displays an error message
- Example:
    - Attempting to divide by 0

Logic Errors

- Errors that are not detected during compilation or while running, but which cause the program to produce incorrect results
    - Compiler will not help you find these
    - Usually the toughest to find and fix
    - Tips:
        - Use println's to help you debug
        - Walk away when you get frustrated, and come back later
- Example: an attempt to calculate Fahrenheit temperature from Celsius temperature by multiplying by 1.8 and adding 23 instead of 32