

# CS100: CPADS

## Program Debugging

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# Program Debugging

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- **Many programs have errors in them (especially programs under development)**
  - Program errors are also referred to as “bugs”
  - There are several different types of errors
- **Finding and correcting the bugs present in software is a process known as debugging**
  - ALL software must go through a debugging process, regardless of how simple the program
  - Must ensure that the software works and produces the correct output under ALL possible inputs

# Types of Software Errors

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- **Syntax error**

- Incorrectly structured programming statements
- Easiest type of error to find and fix; tools will usually point these out

- **Runtime error**

- An exception that occurs during execution of a program
- Examples include: an index-out-of-bounds, attempting to read a file that doesn't exist

- **Semantic error**

- A logical error in the operation of the program
- Program runs without error, but the output is incorrect (e.g.  $2+5 = 177$ )

# Debugging Techniques

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- **Develop in small pieces and TEST OFTEN**
- **Add print statements for computations**
- **Use IDE debugging mode to step through program line by line**
- **IMPORTANT:**
  - These methods are only useful if you know what to expect!!
  - Know what the output of a print statement should be before testing