

# When Things Go Wrong: Debugging

Jamie Saxon

Introduction to Programming for Public Policy

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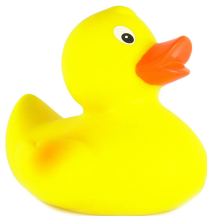
Everyone knows that debugging is twice as hard as writing a program in the first place. So if you're as clever as you can be when you write it, how will you ever debug it?

– Brian Kernighan

- ▶ Bugs are inevitable; debugging is hard.
- ▶ Let's talk briefly about how to deal with bugs.

# Steps

1. **Read the error!** Python generally tells you the location of and code for the error. That may be enough.
2. If you don't understand the error, google it.
3. Add lots of `print` (debug) statements, near where you believe the code is failing, to understand the state of the program.
  - ▶ Or, possibly, use `pdb`: covered next.
4. Build the minimal piece of code that reproduces the bug.
  - ▶ If your 'minimal example' works, then build up from there.
5. Explain your code to a friend (or an inanimate object = duck).



# The Python Debugger

A fast way to see what the computer's actual state is to use pdb

```
■ python -m pdb jamie_spirograph.py
```

**n:** to go to next line of code

**l:** list source code for the current file (or ll).

**b:** set a breakpoint

**c:** continue debugging until you hit a breakpoint

**s:** step into a function

**p:** to print the value of an expression in the current context

# If you are still lost, ask! (But ask well!)

- ▶ Many forums where you can get help, but they can be snarky.
  - ▶ In this class, we have Piazza; in the real world, **stackoverflow**.
  - ▶ Of course – start by searching the forum (indexed on google).
- ▶ A few tips for good questions: [1, 2, 3, 4]
  - ▶ Ask in public, in the right place. Tag it so people can find it.
  - ▶ Meaningful subject line: 'python problem' or 'help!' don't cut it.
  - ▶ Be specific about what you wanted (what's are you trying to do), expected from the program, and got.
  - ▶ Provide your minimal example, so others can reproduce your error.
  - ▶ List the steps you've already tried (demonstrate commitment).
- ▶ Good questions get answered; bad ones get **LMGTFY** (or RTFM).