Debugging

Computer Science 250
Lecture 5
Debugging

• Who writes perfect programs the first time?

• How do you debug when it's wrong?
  – Kind of randomly guess and change things
  – Hope that fixes it
  – Try again…
  – Right?

• How many of you have taken a car to a mechanic?
  – That's how they try to fix your car too right?
  – Randomly poke at stuff until it works?
Debugging: Most useful skill ever

Side note: debugging is

One of the most useful “real world” skills you can learn
Generally not taught in depth
Hard to teach, takes much practice...
Debugging: the Scientific Method in Action

• Computer **Scientists**: How about use science
  – Anyone remember the scientific method?
Debugging: the Scientific Method in Action

- Computer Scientists: How about use science
  – Anyone remember the scientific method?

Observe Phenomenon: “Hey my ‘3’ makes my program crash”

Gather Information: “Interesting, y = 0 at line 10… that’s odd…”

Form Hypothesis: “The program is crashing because I divide by 0 on line 12, and that’s because I use z-3”

Hypothesis?

Test Hypothesis: “Yes, z =3, and that makes y=0, and I do x/y on line 12 and it crashes…”

Right or wrong?

Fix Problem: “Better add an if”
Of course, its not so easy…

- Forming a good hypothesis: hard
  - Easier with experience, expert knowledge
- Gathering the right information: can be tricky
  - Expert knowledge can help determine what to check

- Tool to help: debugger
  - Should really be called “information gatherer to help you form a hypothesis to debug”.
  - We’ll use `gdb`
  - Command reference on website:
  - Now to switch to an example in a terminal…