CS 160
CS Orientation

Intro to CS & Number Conversions
Odds and Ends...

• Go to Lab this week!!!
• Get Assignment #1 demoed this week!!!
• Assignment #2 posted!
Computers Are Everywhere

- Examples:
  - homes, offices, rooms/servers, phones, pacemakers, cars, etc.

- What is the difference b/w these?
  - Complexity
  - Size

(car, phones, people / supercomputer / trade off)

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What is an algorithm?

• Step-by-step description of how to accomplish a task, i.e. recipe
• Algorithmic thinking
• Expressed in any language
  – Natural
  – Programming
What is programming?

• Problem Statement
• Solve the Problem
• Specify Algorithm
• Algorithm -> Computer Language
Hardware vs. Software

• Computer: **machine** that manipulates data and carries out **set of instructions**

• Hardware
  – CPU
  – RAM
  – Hard Disk

• Software
  – Programs
Software/Programs

• Primary piece of software on computer?
• What is its purpose?
• What are applications?
Programming

• Writing **code** that a computer can **execute**
  – Does that mean we have to write in binary?

• High-level language
  – Translated **Continuously** during runtime
    • Interpreted – Slower
    • Just in time compilation/caching
  – Translated Prior/Ahead of time to runtime
    • High-level -> machine language
    • High-level -> intermediate language
Digital Realm

• Based on discrete #s
  – Specifically: Circuits

• Binary, i.e. base 2
  – 0 or 1

• What base do most people use?
  – What is the range for each digit?

• What is Hexadecimal?, i.e. base 16
  – What is the range for each digit?
Decimal, Binary, & Hex

- Decimal
  - Powers of 10
- Binary
  - Powers of 2
- Base X to Base 10 conversion
  - 32 (base 10): $3 \times 10^1 + 2 \times 10^0 = 32$ (base 10)
  - 1000000 (base 2): $1 \times 2^5 + 0 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 = 32$ (base 10)
  - How do we express 35 (base 10) in base 2 vs. base 16?