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
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
    • 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)
  - 100000 (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?
Get into groups 4-5

• Convert 11110010 (base 2) to base 10.

• Convert 130 (base 10) to base 2.
More Binary

• What is each digit called?
• What is a Byte?
• How many numbers can be expressed in a Byte?
  – Signed/Unsigned
• What is the smallest number?
• What is the largest number?
• Help:

http://classes.engr.oregonstate.edu/eecs/fall2015/cs160-001/Exam1Review1.txt
Get into groups 4-5

• What is the smallest/largest unsigned number in 16 bits?

• What is the smallest/largest signed number in 16 bits?

• What is the smallest/largest unsigned number in x bits?