CS 160
CS Orientation

Number Conversions/Algorithms
Odds and Ends...

• Go to Lab this week!!!
• Get Assignment #1 demoed this week!!!
• TA offices in KEC 1087!
• Keep working on Assignment #2!
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?
Exercise #1: Get into groups 4-5

• Convert 11110010 (base 2) to base 10.
  \[
  1\times2^7 + 1\times2^6 + 1\times2^5 + 1\times2^4 + 0\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0 = 242
  \]

• Convert 130 (base 10) to base 2.
  \[
  \begin{array}{c|c}
  \text{Quotient} & \text{Remainder} \\
  \hline
  65 & 2 \\
  32 & 0 \\
  16 & 0 \\
  8 & 0 \\
  4 & 0 \\
  2 & 0 \\
  1 & 0 \\
  \hline
  0 & 1
  \end{array}
  \]
  \[
  100000010
  \]
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/fall2016/cs160-001/Exam1Review1.txt