CS 161
Intro to CS I

What is CS all about?

Exercise #1 – Extra Credit

- Get into groups 4-5.
- Everyone write their name on the piece of paper.
- Have someone record each person's **major** and **why you decided to take CS 161**.

Computers Are Everywhere

- Examples:
  - homes, offices, rooms/servers, phones, pacemakers, cars, etc.
- What is the difference b/w these?
  - Complexity
  - Size

What is a computer?

- A Computational Device
  - It computes (input-> processing -> output)
  - Modern: device that can be programmed to carry out an algorithm.

study of computational devices/hardware

- What is Computer Science?

- design of algorithms
- problem solving

- programming - software systems
- operating systems
- languages

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

- Why do we teach programming 1st?

• limitations
• broaden horizons
• abstractions (understand)
• interest level
• testing to see if it works

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?

OS - operating system

interface between programs & hardware

Digital Realm

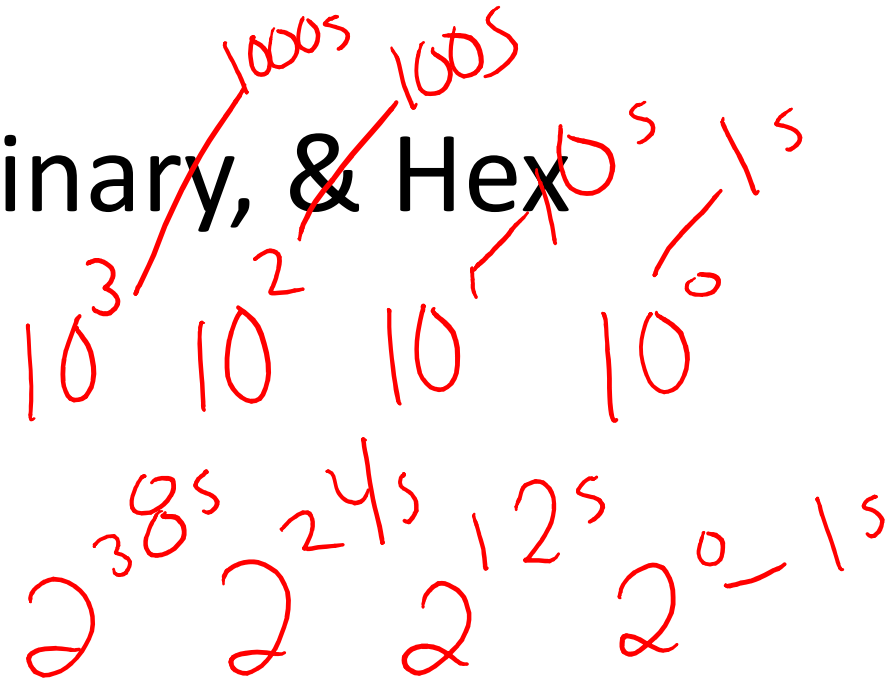
- Based on discrete #s
  - Specifically: Circuits
- Binary, i.e. base 2
  - 0 or 1
- What base do most people use?
  - What is the range for each digit?
- What is Hexadecimal?, i.e. base 16
  - What is the range for each digit?

open/close } only two choices
on/off

decimal
base 10
0 - 9

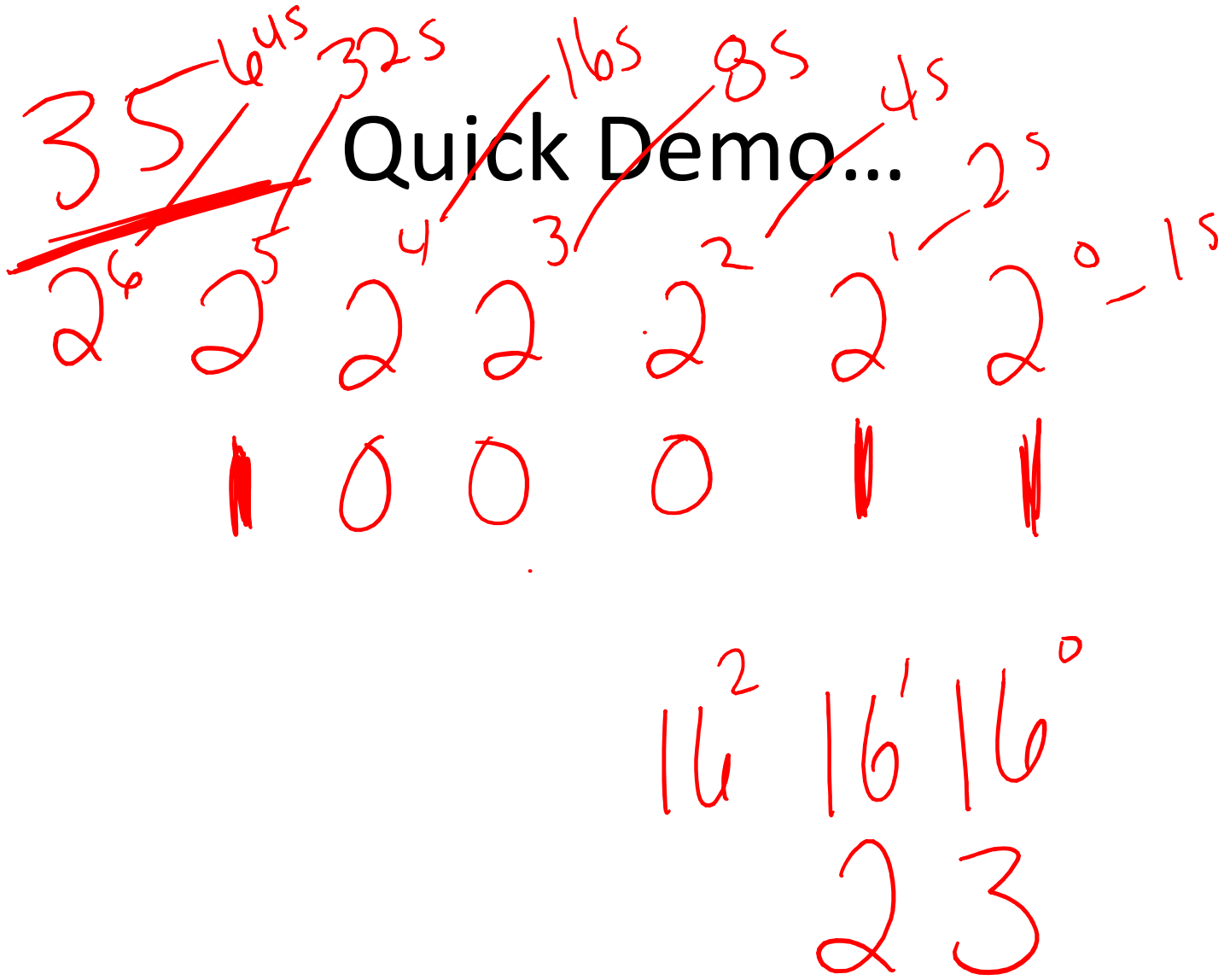
0 - 15
0 - 9 a - f

Decimal, Binary, & Hex



- Decimal
  - Powers of 10
- Binary
  - Powers of 2
- Base X to Base 10 conversion
  - 32 (base 10): $3*10^1 + 2*10^0 = 32$ (base 10)
  - 100000 (base 2): $1*2^5 + 0*2^4 + 0*2^3 + 0*2^2 + 0*2^1 + 0*2^0 = 32$ (base 10)
  - How do we express 35 (base 10)
    - base 2
    - base 16

Quick Demo…


35
64s
32s
16s
8s
4s
2s
1s
2^6 2^5 2^4 2^3 2^2 2^1 2^0
1 0 0 0 1 1
16^2 16^1 16^0
23

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?

What does this mean for us?

- Class Discussion…