What is programming?
Chap. 1.1
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.

• Computer Science
  – The study of devices that can be programmed
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?
  - Tool to test our algo easier??
Hardware vs. Software

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

• Hardware
  – CPU
  – RAM
  – Hard Disk

• Software
  – Programs
Software/Programs

- OS

• Primary piece of software on computer?
• What is its purpose?
• What are applications?
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): $3\times10^1 + 2\times10^0 = 32$ (base 10)
  – 1000000 (base 2): $1\times2^5 + 0\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 0\times2^0 = 32$ (base 10)
  – How do we express 35 (base 10) in base 2 vs. base 16?