Overview of Automata

One of our general models of computation

- Regular expressions
- Grammars — context-free and otherwise
- Automata — “machines”

Help answer the question: What is computation?

- Computing a function — relating input and output
- Generating or enumerating a language
- Accepting or recognizing an input
Types of Automata

- **Finite automata** — regular languages

- **Push-down automata** — context-free languages

- **Linear-bounded automata** — context-sensitive languages

- **Turing machines** — recursively enumerable languages

- There are others: random access machines, parallel random access machines, arrays of automata
Characteristics of Automata

- **State**

- **Input** and/or **output**

- **Transitions**

- **Computation as a sequence of steps**

- **Configuration**: everything the machine needs to continue the computation

- **Computing** a function or **accepting** a language
How Types of Automata Differ

• In the particular details of the model

• In complexity (or simplicity)

• In power

• In the functions that can be computed

• In the languages that can be accepted