

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