

Basic Definitions

- A *finite state machine* has the following:
 - A finite set of “state” of which exactly one is occupied at any given time.
 - A finite set of recognized input symbols.
 - A function that, for every state and recognized input symbol, determines the next state for the machine to take.
- A Turing machine is a finite state machine with input from and output to a single two-way tape. At each cycle of operation, the machine reads the current tape location, then optionally writes over the input at that location, then moves the tape either one location to the left or one location to the right.

Fundamental Principles

- **Gödel’s Theorem.** In any consistent formal system that includes basic (Peano) arithmetic, there exist true statements that cannot be proved.
- **Universality** Any function that can be computed by any finite, deterministic computational process can be computed by a Turing machine.