Notation
\[ \epsilon, \{\epsilon\}, \Phi \]
\[ L_1 \sqcap L_2 = \{xy \mid x \in L_1, y \in L_2\} \]
\[ L^* = \{\epsilon\} \cup L \cup L^2 \cup L^3 \cup \cdots \]
\[ 2^S \text{ set of all subsets} \]
\[ \{0^n1^n \mid n \geq 1\} \text{ and } \{0^n1^n \mid n \geq 1\}^* \]

Concepts
- fa
- nfa
- e-nfa
- e-closure
- regular set
- regular expression
- induction
- definition of \(h h^{-1}\)
- closure properties of regular sets
  - Union, dot, star
  - complement, machine construction
  - intersection
  \[ L_1 \sqcap L_2 = \overline{L_1} \cup \overline{L_2}\] or cross product machine construction
  \[ h h^{-1}\]
- reversal
- prove set not regular

Constructions
- cross product construction
- subset construction
- hat technique
- \[ h(h^{-1}(L) \sqcap R) \]
- nfa to fa subset construction
- fa to regular expression \(R_y^k\)
- regular expression to fa
- valid computation of fa
- Write regular expression from English description
  - often break string down into pieces
- pumping lemma

Examples
- shuffle
Touched on
  countably infinite
  noncountably infinite
  diagonalization
  there exist non regular sets