Ch 1.4 Nonregular languages (S)

How to prove certain languages can't be recognized by any finite automaton.

The Pumping Lemma for Regular Languages

Pumping Lemma
If A is a regular language, then there is a number p (the pumping length) where if s is any string in A of length at least p , then s may be divided into three pieces, $s = xyz$, satisfying the following conditions:
1. for each $i \geq 0$, $xy^iz \in A$,
2. $|y| > 0$, and
3. $|xy| \leq p$.

Remark: $|s|$ represents the length of string s, y^i means that i copies of y are concatenated together, and y^0 equals ϵ.

Skipped proof ideas and proof, examples.