Software Specifications
The Pumping Property of State Diagrams

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Regular Languages

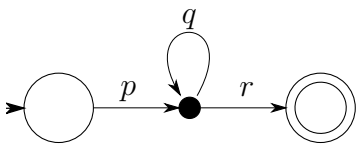
A regular language is a language that can be specified by a Regex. This type of language is well suited to be converted to a State Diagram using the algorithm to convert a Regex to ϵ-DFA from lesson 14. Furthermore, There are other algorithms that we have learned about that can convert a ϵ-DFA to a DFA to a NFA
There are however, limitations to what a regular language can be.
For example:

$$\{a^i b^i | i \geq 0\}$$

The set of balanced strings (above) is not regular. This is because one would need an infinite amount of states to represent this Regex in a State Diagram as each length of word would be a different state. Furthermore, the state diagram would have to accept illegal strings in order to represent the balanced set.

The Pumping Property of Deterministic State Diagrams

Accepting computation on a string x where x has a length greater than the number of states



This shows the state diagram for a computation on x_i such that:

$$x = p \cdot q^k \cdot r$$

where x is accepted $\forall_k \{k \geq 0\}$. Thus, this yields to us the nonregularity conditions formalized in the **pumping lemma**