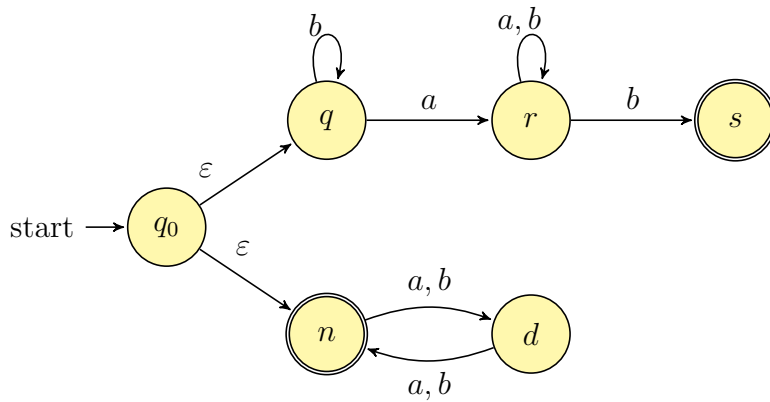


Week2 friday

Review: The language recognized by the NFA over $\{a, b\}$ with state diagram



is:

So far, we know:

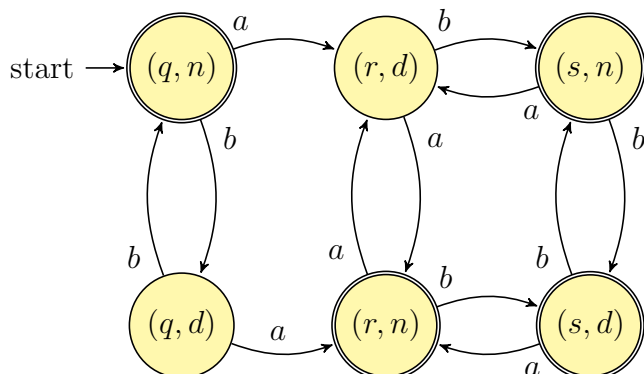
- The collection of languages that are each recognizable by a DFA is **closed** under complementation.
Could we do the same construction with NFA?
- The collection of languages that are each recognizable by a NFA is **closed** under complementation.
Could we do the same construction with DFA?

Happily, though, an analogous claim is true!

Suppose A_1, A_2 are languages over an alphabet Σ . **Claim:** if there is a DFA M_1 such that $L(M_1) = A_1$ and DFA M_2 such that $L(M_2) = A_2$, then there is another DFA, let's call it M , such that $L(M) = A_1 \cup A_2$.
Theorem 1.25 in Sipser, page 45

Proof idea:

Formal construction:



Suppose A_1, A_2 are languages over an alphabet Σ . **Claim:** if there is a DFA M_1 such that $L(M_1) = A_1$ and DFA M_2 such that $L(M_2) = A_2$, then there is another DFA, let's call it M , such that $L(M) = A_1 \cap A_2$.
Footnote to Sipser Theorem 1.25, page 46

Proof idea:

Formal construction: