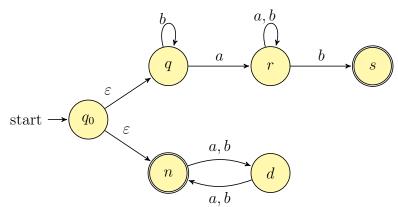
Week2 friday

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?

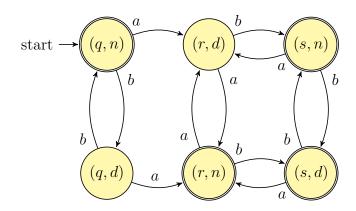
Happily, though, an analogous claim is true!

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:

Example: When $A_1 = \{w \mid w \text{ has an } a \text{ and ends in } b\}$ and $A_2 = \{w \mid w \text{ is of even length}\}.$



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: