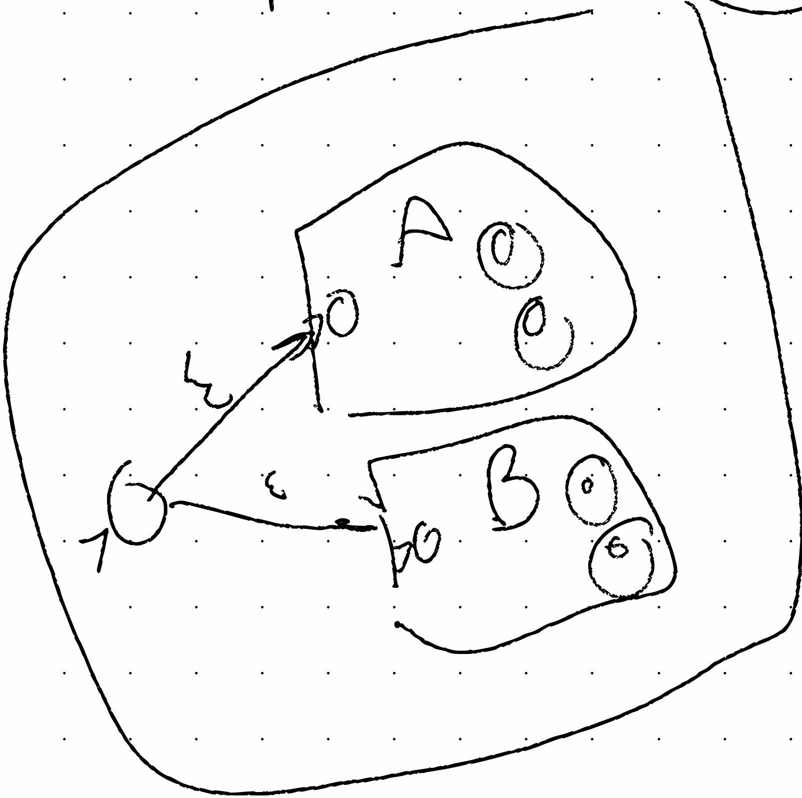
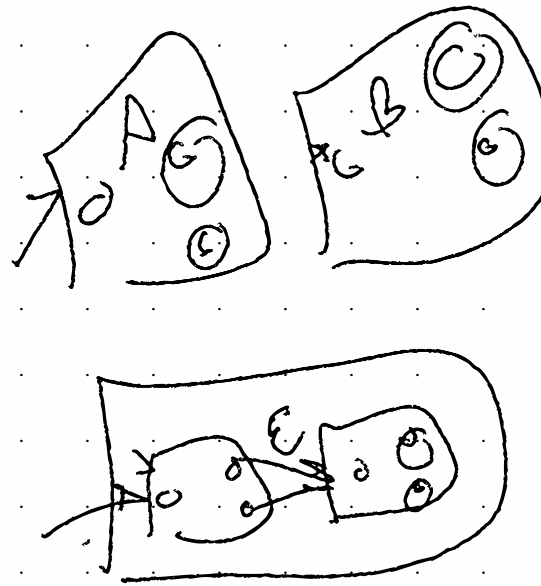
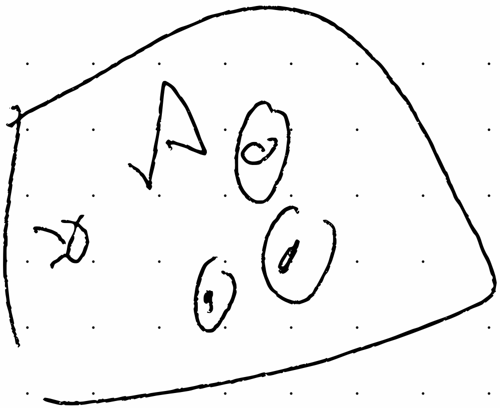
p59

$A \cup B$

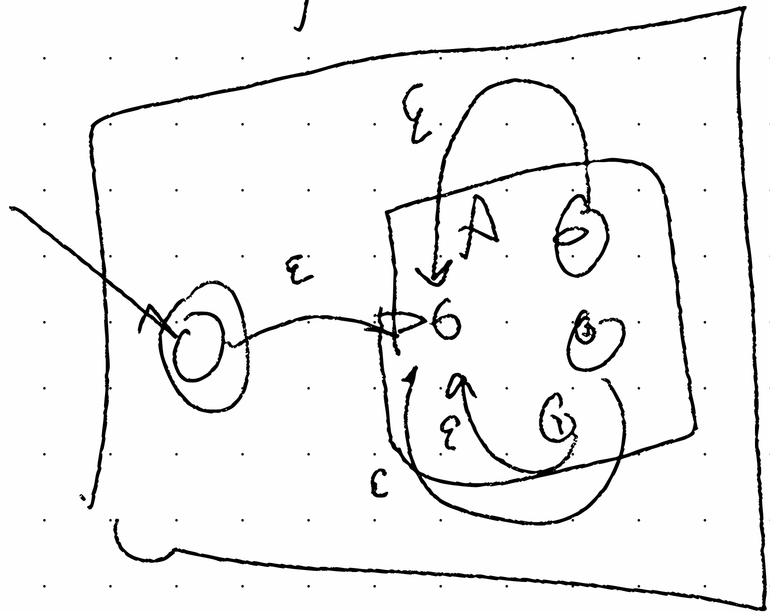


$A \cdot B$

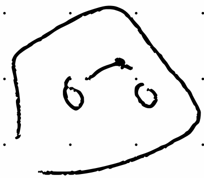




A^*



R.E. $a^* b^+$

DFA 

NFA

$L \subseteq \Sigma^*$

L is R.E.

L is

$\Rightarrow L$ is recognized by some NFA

RE $\Rightarrow$ NFA

process

DFA $\longrightarrow$ NFA

If exists a DFA that accepts some $L \subseteq \Sigma^*$ - then there is an NFA that accepts L.

$('A','a'): 'B' \longrightarrow ('A','a'): ['B']$

$Q \times \Sigma \to Q$

$Q \times \Sigma \to \mathrm{Pow}(Q)$

$Q \to [\,'Q'\,]$

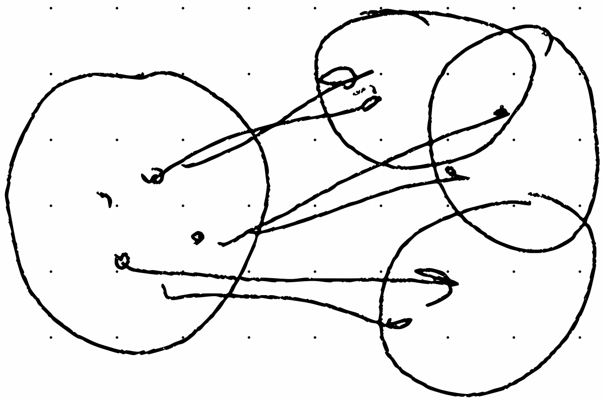
Generalize NFA

DFA → NFA → DFA → GNFA

RE → NFA

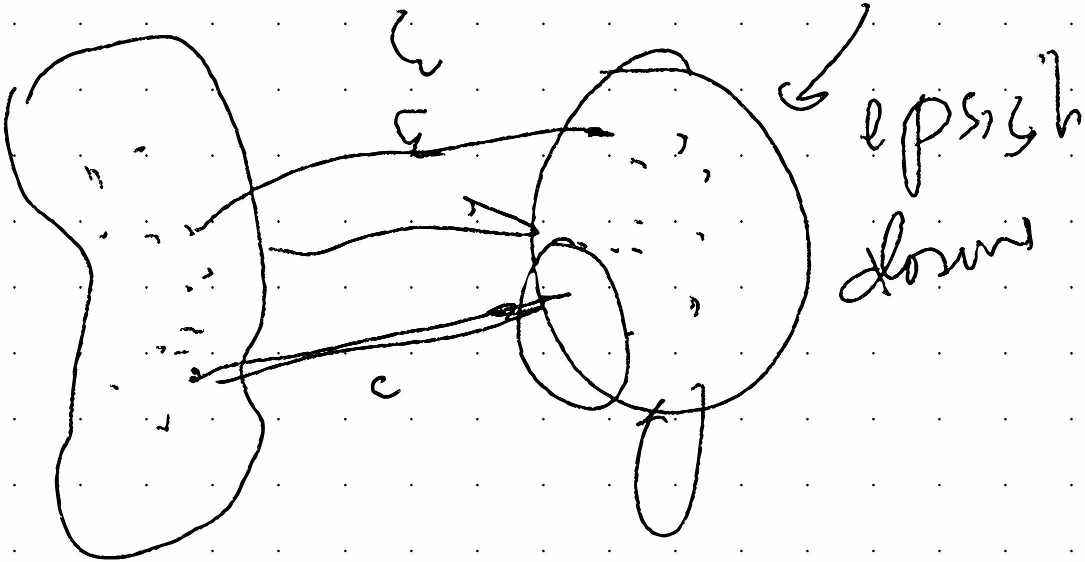
DFA $\longrightarrow$ NFA

current set of states



union

for s in State



NFA to a DFA think 4 states of states, as a state.

('A', 'x'): 'B'   B = epsilon

$$(\underset{A}{\underline{\text{set}(\ldots)}}, \text{'x'}) : \underset{B}{\underline{\text{set}(\ldots)}}$$

$\longrightarrow$ for s in A:
B = union(δ(s, 'x'))
return epsilon-closure(B)

$$(A, a) \mapsto \overline{\mathcal{E}}\left(\bigcup_{s \in A} \delta(s, a) \right)$$

$\overline{\text{Final}} = \quad B \cap F \neq \emptyset$

mark all S ~~tha~~ for which previous $S \cap F \neq \emptyset$

DFA NFA

$|Q| = n$ $\quad$ $|\hat{Q}| = 2^n$

10 states $\quad$ 1024

finals also get BIG

$$
\begin{tikzcd}
NFA \arrow[r] & DFA \arrow[d] \\
RE \arrow[u] & GNFA \arrow[l]
\end{tikzcd}
$$

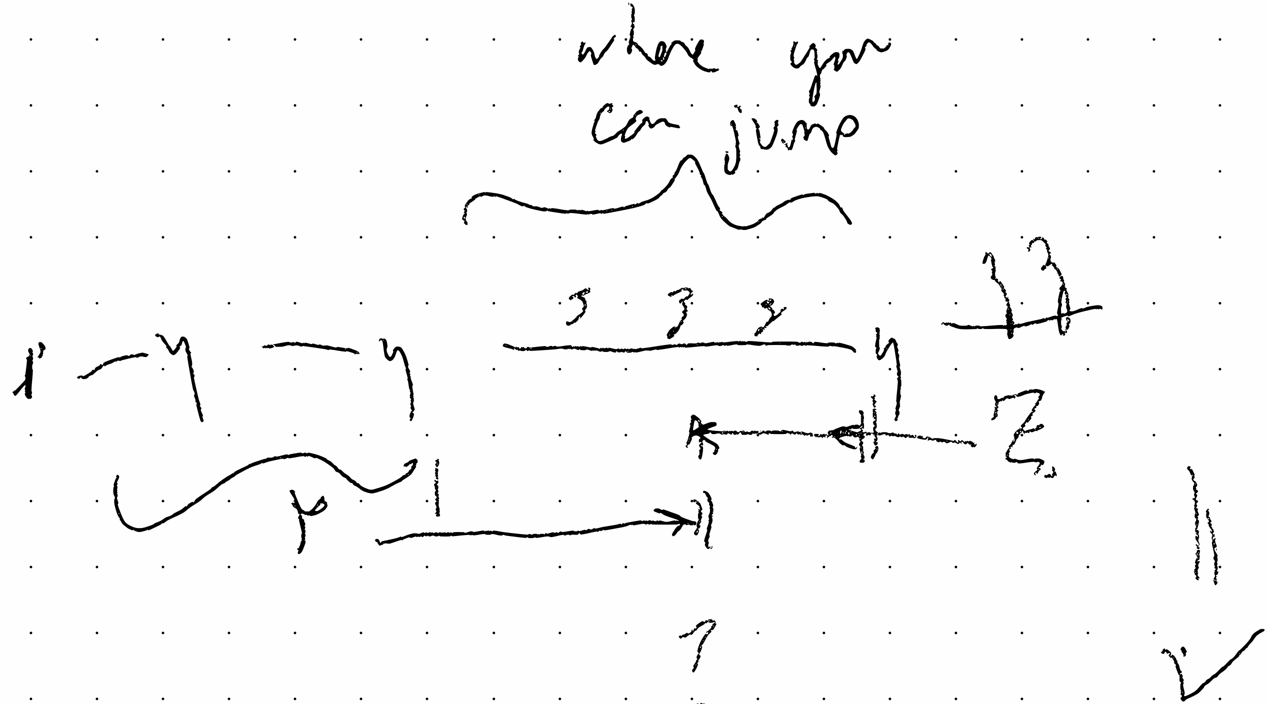
refer to the textbook for the GNFA and reduction to an R.E.

$L = \{ w \mid w = st,$ s has exactly 2 y's, and t has exactly 2 3's $\}$

$w \in \{x, y, 3\}^*$

$yyy333 \notin L$

$yy3 | y33 \in L$


where you can jump