7-1/ NFAs and DFAs are both repr of REG

regular languages

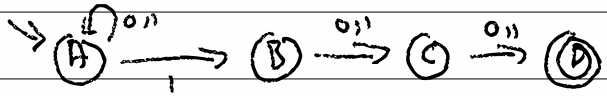
$\forall d \in DFA.\ \exists n \in NFA.\ L(d) = L(n)$

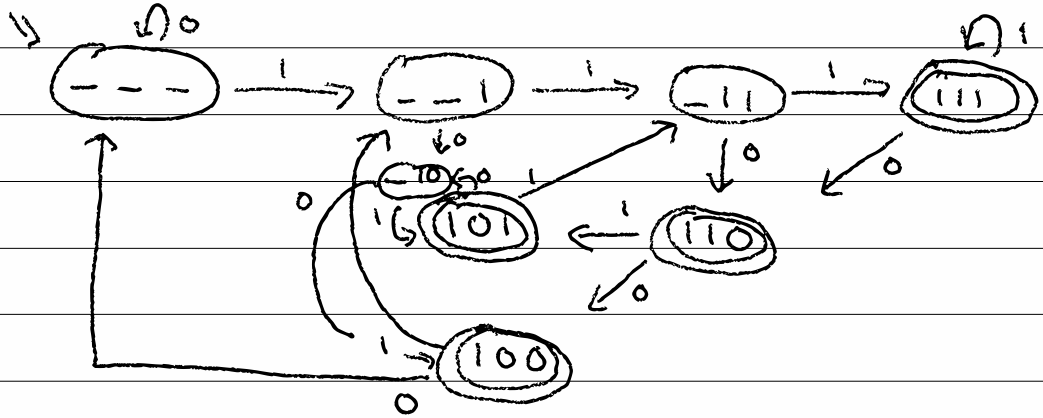
convert

$\forall n \in NFA.\ \exists d \in DFA.\ L(n) = L(d)$

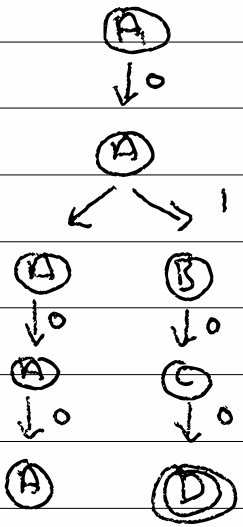
compile

7-2) 3rd from end is 1

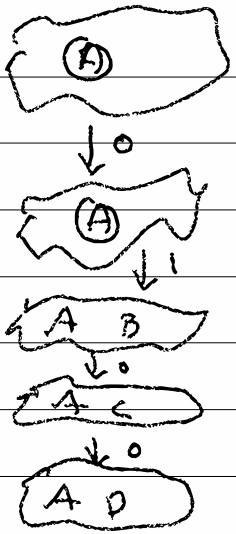




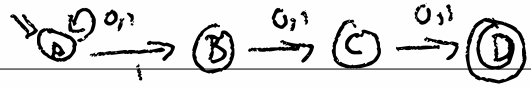
7-3/ 0100

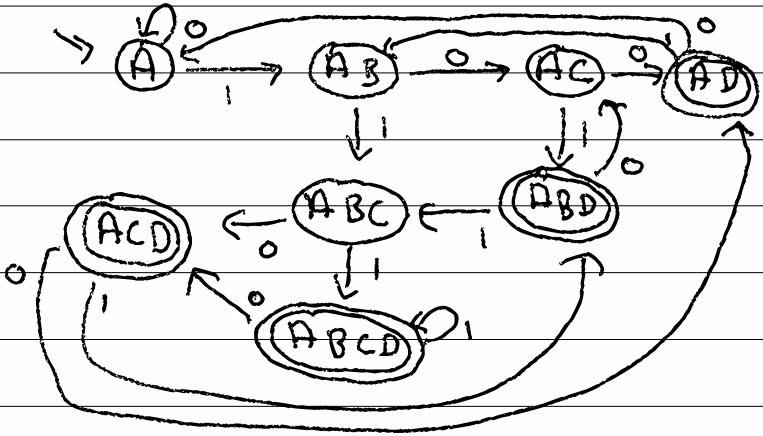


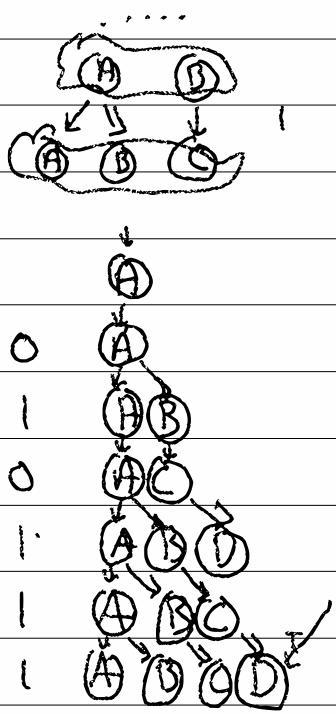
0
1
0
0



7-4/







7-5) in NFA: Q_n, Σ, $q_{0n} \in Q_n$, $\delta_n : Q_n \times M(\Sigma) \to P(Q_n)$

$F_n \subseteq Q_n$

out DFA: Q_D, Σ, $q_{0D} \in Q_D$, $\delta_d : Q_D \times \Sigma \to Q_D$

$F_D \subseteq Q_D$

$Q_D = P(Q_n)$ // $x \in P(A)$ iff $x \subseteq A$

$q_{0D} = \{q_{0n}\} \to E(\{q_{0n}\})$

$F_D =$ any state that has a member in F_n

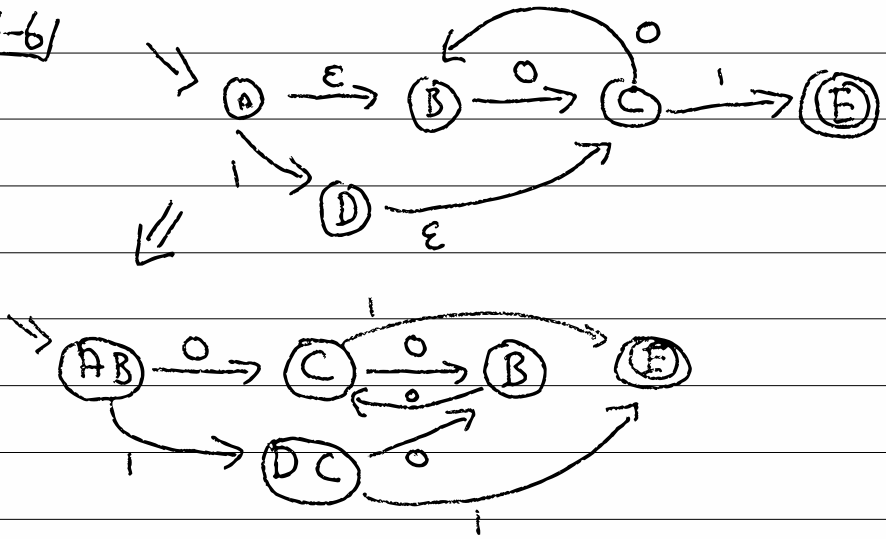
$= \{q_d \in Q_D \mid q_d \cap F_n \neq \emptyset\}$

$\delta_d(q_d, c) = \bigcup_{q_n \in q_d} \delta_n(q_n, c)$

$E\left(\bigcup_{q_n \in q_d} \delta_n(q_n, c)\right)$

* except... ε

7-6)



7-7) $E : Q_D \to Q_D$

E "follows all epsilon transitions"

$$E'(X) = E'\left(X \cup \bigcup_{q_n \in X} \delta_n(q_n, \varepsilon)\right)$$

lfp

least fixed point

→ (A) ⊆ (B) ⊇ (C)

$$E(X) = X_n \text{ s.t. } E'(X_n) = X_n \text{ and } X \subseteq X_n$$

```
function E (X) {
  var changed = true;
  while changed {
    changed = false,
    for q_n ∈ X
      for q_n' ∈ δ_n(q_n, ε)
        if q_n' ∉ X, changed = true
          X = X ∪ {q_n'}
  return X
```

7-8/ DFAs and NFAs describe the same set of languages, i.e. problems.