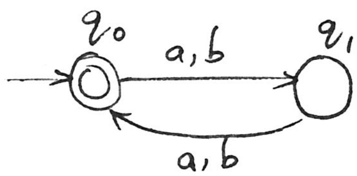
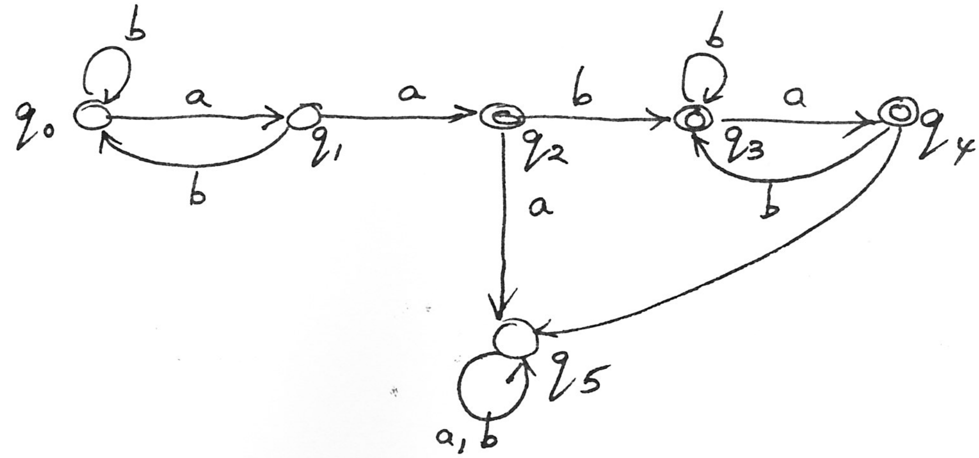
ex:



$$\overset{X}{A_0} = aA_1 \cup bA_1 \cup \epsilon = (a \cup b)A_1 \cup \epsilon = \overbrace{(a \cup b)(a \cup b)}^{A}\overset{X}{A_0} \cup \overset{B}{\epsilon}$$

$$A_1 = (a \cup b)A_0$$

ex: words with one occurence of 'aa'



$$A_0 = bA_0 \cup aA_1$$
$$A_1 = bA_0 \cup aA_2$$
$$A_2 = bA_3 \cup aA_5 \cup \epsilon$$
$$A_3 = bA_3 \cup aA_4 \cup \epsilon$$
$$A_4 = bA_3 \cup aA_5 \cup \epsilon$$
$$A_5 = (a \cup b)A_5 = \phi$$
$$= (a \cup b)A_5 \cup \phi$$

$$A_5 = (a \cup b)^* \cdot \phi = \phi$$

$A_0 = bA_0 + aA_1$

$A_1 = bA_0 + aA_2$

$A_2 = bA_3 + \epsilon$

$A_3 = bA_3 + aA_4 + \epsilon$

$A_4 = bA_3 \cancel{} + \epsilon$

Arden's Lemma

$X = AX + B, \epsilon \notin A$

then

$X = A^* B$

$A_3 = bA_3 + abA_3 + a + \epsilon$

$= (b+ab)A_3 + (a+\epsilon)$

$A_3 = (b+ab)^* (a+\epsilon)$

$A_2 = b(b+ab)^* (a+\epsilon) + \epsilon$

$A_1 = bA_0 + a[b(b+ab)^* (a+\epsilon) + \epsilon]$

$A_0 = bA_0 + abA_0 + aa[b(b+ab)^* (a+\epsilon) + \epsilon]$

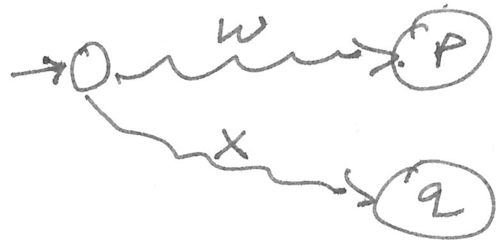
$= (b+ab)A_0 + aa[b(b+ab)^* (a+\epsilon) + \epsilon]$

$A_0 = (b+ab)^* aa[b(b+ab)^* (a+\epsilon) + \epsilon]$

MIN

def distinguishable pair (p,q) of states

if



$w \neq x$

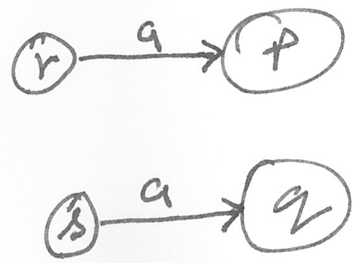
Alg (intuition)

1. mark (p,q) as distinguishable if

$$(p \in F \text{ and } q \notin F) \text{ or } (p \notin F \text{ and } q \in F)$$

2. take a pair (p,q) that is distinguishable

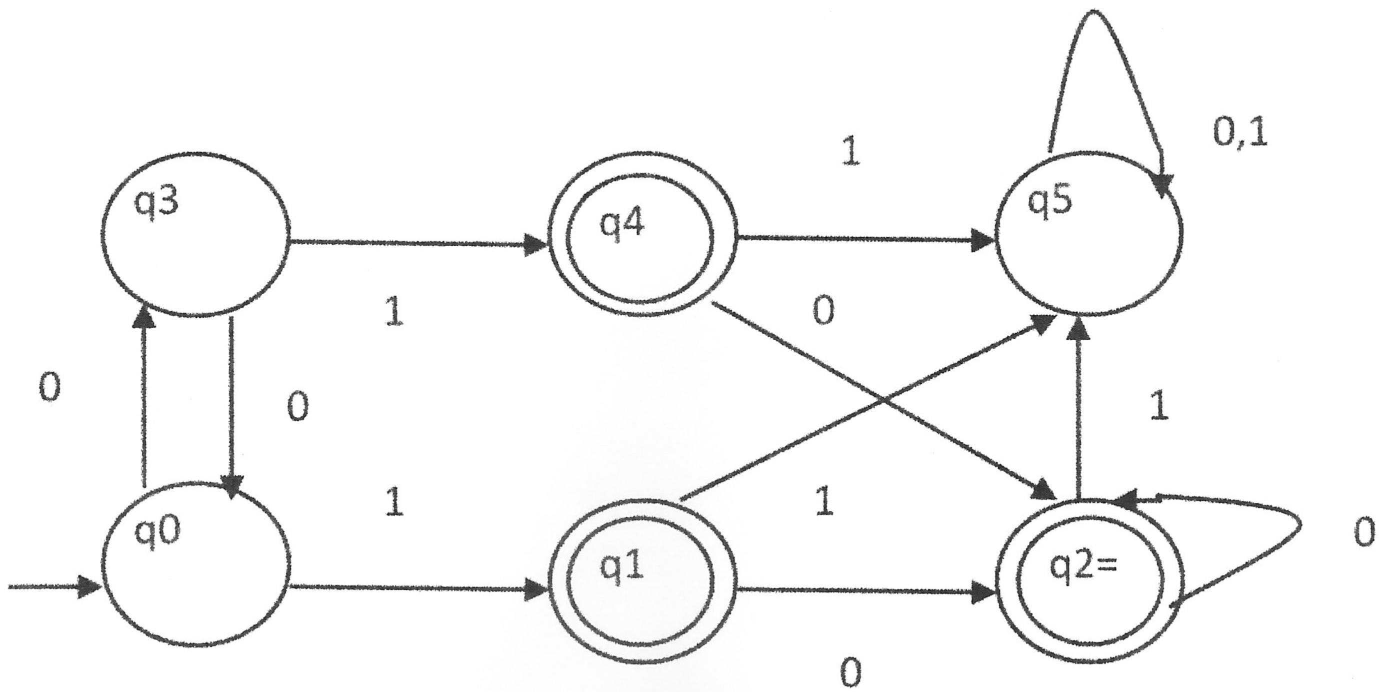
if (r,s) exists s.t.



$r \neq s$

then (r,s) is distinguishable

~~d2-nonmined fo~~



q_1	X				
q_2	X	•			
q_3	•	X	X		
q_4	X	•	•	X	
q_5	X	X	X	X	X
	q_0	q_1	q_2	q_3	q_4

indistinguishable pairs

$\{(q_1, q_2), (q_2, q_4) (q_1, q_4)$

$(q_0, q_3)\}$

Equivalence classes = $\{q_0, q_3\}, \{q_1, q_2, q_4\}$