Table Filling Method [Myhill Nerode Theorem]

Steps:

(I) Draw a table for all pairs of state (P, Q)

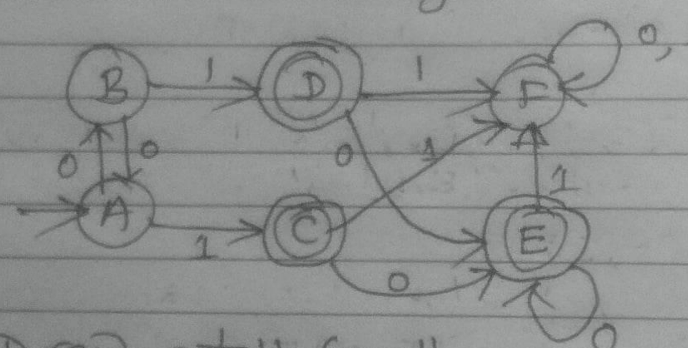
(II) Mark all pairs where $P \in F$ & $Q \notin F$ and vice-versa.

(III) If there are any unmark pairs (P, Q) such that $[\delta(P, x), \delta(Q, x)]$ is marked then mark (P, Q) where 'x' is an input symbol.

(IV) Repeate step (III) untill no more marking can be done (made).

(V) Combine all the unmarked pairs and make them as a single state in the minimized DFA

Q Minimize the following DFA



Sol^n: (I) Draw a table for all pairs of state (P, Q) as.

	A	B	C	D	E
B					
C	✓	✓			
D	✓	✓	✓		
E	✓	✓	✓	✓	
F			✓	✓	✓

B					
C	✓	✓			
D	✓	✓			
E	✓	✓			
F	✓	✓	✓	✓	✓
	A	B	C	D	E

For pair (A, B), $(\delta(A,0), \delta(B,0)) = (B, A)$ ← unmarked
$(\delta(A,1), \delta(B,1)) = (C, D)$ ← unmarked

Similarly, for pair (C, D)
$(\delta(C,0), \delta(D,0)) = (E, E)$ ← unmarked
$(\delta(C,1), \delta(D,1)) = (F, F)$ ← unmarked

For pair (C, E)
$(\delta(C,0), \delta(E,0)) = (E, E)$ ← unmarked
$(\delta(C,1), \delta(E,1)) = (F, F)$ ← unmarked

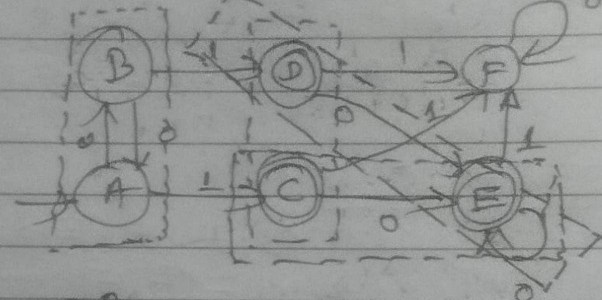
For pair (D, E)
$(\delta(D,0), \delta(E,0)) = (E, E)$ ← unmarked
$(\delta(D,1), \delta(E,1)) = (F, F)$ ← unmarked

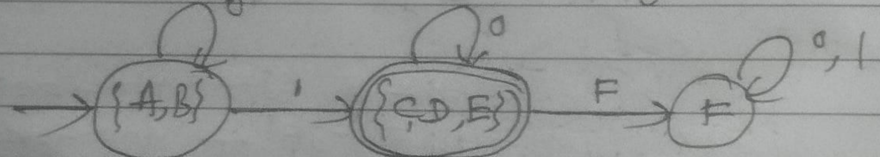
For pair (F, A)
$(\delta(F,0), \delta(A,0)) = (F, B)$ ← unmarked
$(\delta(F,1), \delta(A,1)) = (F, C)$ ← marked

For pair (F, B)
$(\delta(F,0), \delta(B,0)) = (F, A)$ ← marked
$(\delta(F,1), \delta(B,1)) = (F, D)$ ← marked
if any one marked, then mark (F, B)

Again repeate the process for unmarked pair (A,B), (C,D), (C,E) and (D,E) we have the same result as above. So, the resultant DFA (ie minimized DFA) is:

List the unmarked states pairs and combine them as: (A,B), (C,D), (C,E), and (D,E)





fig(1) Minimized DFA.

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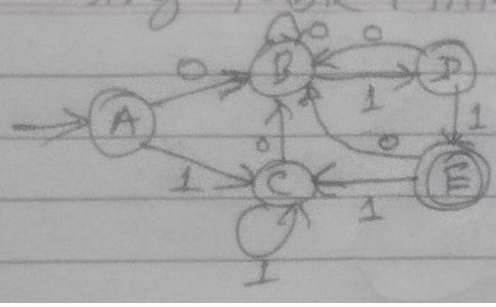
Minimize the following DFA using Table filling method



	A	B	C	D
B	✓			
C				
D	✓	✓	✓	
E	✓	✓	✓	✓

For pair (B, A): $\delta(B,0), \delta(A,0) = (B, B) \leftarrow$ Unmark
$\delta(B,1), \delta(A,1) = (D, C) \leftarrow$ Unmark

For pair (C, A): $\delta(C,0), \delta(A,0) = (B, B) \leftarrow$ UM
$\delta(C,1), \delta(A,1) = (C, C) \leftarrow$ UM

(C, B): $\delta(C,0), \delta(B,0) = (B, B) \leftarrow$ UM
$\delta(C,1), \delta(B,1) = (C, D) \leftarrow$ UM

(D, A): $\delta(D,0), \delta(A,0) = (B, B) \leftarrow$ UM
$\delta(D,1), \delta(A,1) = (E, C) \leftarrow$ marked

(D, B): $\delta(D,0), \delta(B,0) = (B, B) \leftarrow$ UM
$\delta(D,1), \delta(B,1) = (E, D) \leftarrow$ M

(D, C): $\delta(D,0), \delta(C,0) = (B, B) \leftarrow$ UM
$\delta(D,1), \delta(C,1) = (E, C) \leftarrow$ M

Now, repeating the unmarked pairs (B, A), (C, A), and (C, B), have the same result as above of unmark.

2nd iteration

(B, A): $\delta(B,0), \delta(A,0) \rightarrow (B, B) \leftarrow$ UM
$\delta(B,1), \delta(A,1) \rightarrow (D, C) \leftarrow$ marked

(C, A): $\delta(C,0), \delta(A,0) \rightarrow (B, B) \leftarrow$ UM
$\delta(C,1), \delta(A,1) \rightarrow (C, C) \leftarrow$ UM

(C, B): $\delta(C,0), \delta(B,0) \rightarrow (B, B)$ UM
$\delta(C,1), \delta(B,1) \rightarrow (C, D)$ marked

Third iteration: $(C, A) \rightarrow$ no effect.

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combine the unmark pair.

so, the minimized DFA is