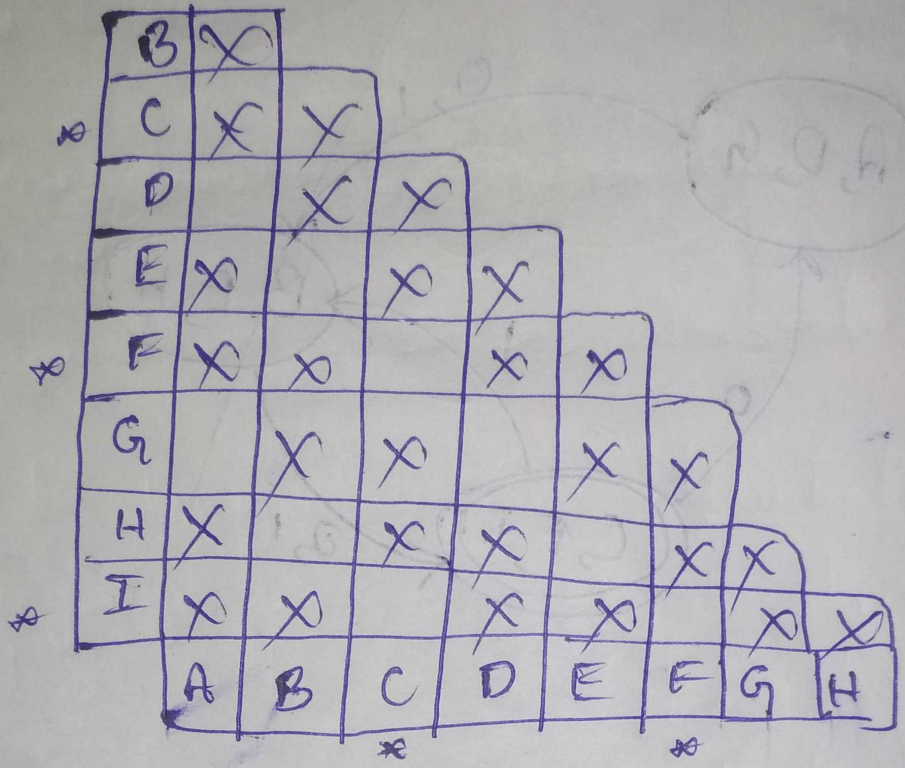
Q Minimise the following DFA using table filling algorithm.

δ	0	1
→A	B	E
B	C	F
*C	D	H
D	E	H
E	F	I
*F	G	B
G	H	B
H	I	C
*I	A	E



δ	0	1
(A,B)	(B,C)	(E,F)
(A,D)	(B,E)	(E,H)
(A,E)	(B,F)	(E,I)
(A,G)	(B,H)	(E,B)
(A,H)	(B,I)	(E,C)
(B,D)	(C,E)	(F,H)
(B,E)	(C,F)	(F,I)
(B,G)	(C,H)	(F,B)
(B,H)	(C,I)	(F,C)
(D,E)	(E,E)	(H,I)
(D,G)	(E,H)	(H,B)
(D,H)	(E,I)	(H,C)
(E,G)	(E,H)	(I,B)
(E,H)	(F,I)	(I,C)
(G,H)	(H,I)	(B,C)

⇒

δ	0	1
(A,D)	(B,E)	(E,H)
(A,G)	(B,H)	(E,B)
(B,E)	(C,F)	(F,I)
(B,H)	(C,I)	(F,C)
(D,G)	(E,H)	(H,B)
(E,H)	(F,I)	(I,C)

From the above table

⇒ A ≡ D & D ≡ G & A ≡ G

∴ A ≡ D ≡ G

⇒ B ≡ E & E ≡ H & B ≡ H

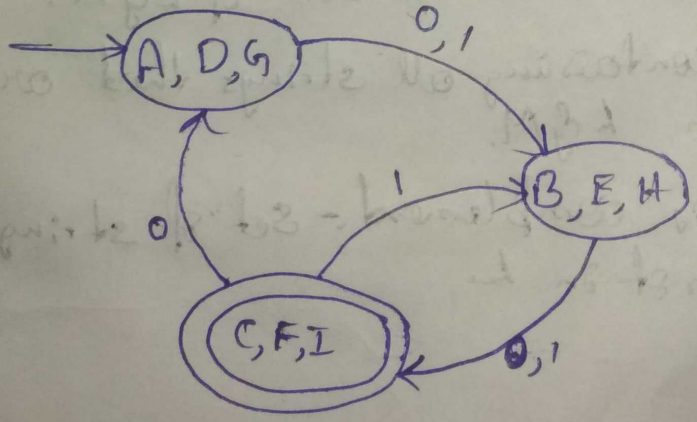
∴ B ≡ E ≡ H

⇒ C ≡ I ≡ F

⇒

δ	0	1
(A,D,G)	(B,E,H)	(B,E,H)
(B,E,H)	(C,F,I)	(C,F,I)
(C,F,I)	(A,D,G)	(E,B,H)

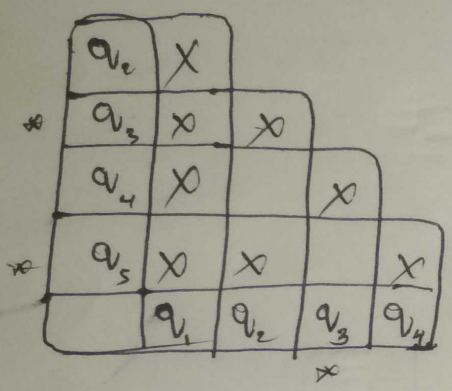
Transition diagram of minimised DFA.



② Consider the DFA given by the transition table

δ	0	1
→ q_1	q_2	q_3
q_2	q_3	q_5
* q_3	q_4	q_3
q_4	q_3	q_5
* q_5	q_2	q_5

	0	1
→ q_1	q_2	* q_3
q_2	* q_3	* q_5
* q_3	q_4	* q_3
q_4	* q_3	* q_5
* q_5	q_2	* q_5



Now

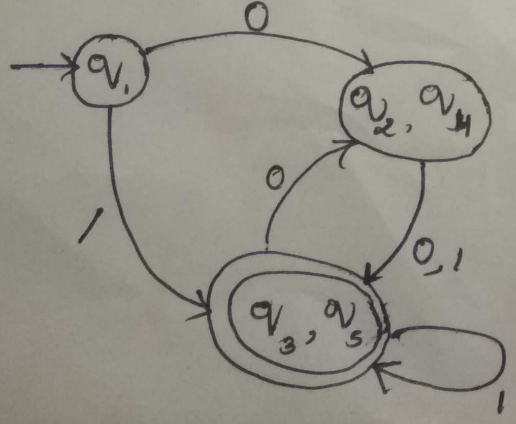
	0	1	
A → q_1	q_2	q_3	(NF, F)
B * q_2	q_3	q_5	(F, F)

III'y (q_1, q_2), (q_1, q_4) will also get cancelled

∴ Now

(q_2, q_4) & (q_3, q_5) are equivalent.

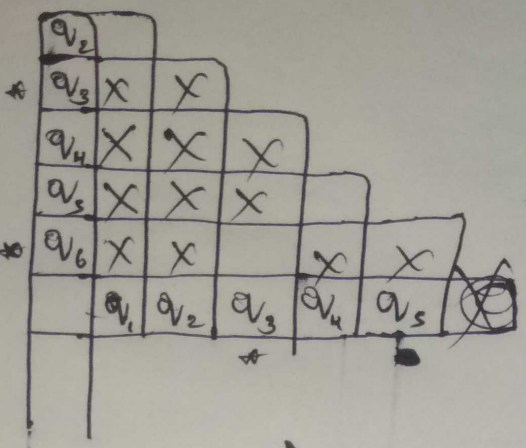
Reduced state transition diagram.



Tutorial:

Repeat exercise 4.4.1 for the DFA 4.4.2

δ	0	1
→ q_1	q_2	q_6
q_2	q_1	q_3
* q_3	q_2	q_4
q_4	q_4	q_2
q_5	q_4	q_5
* q_6	q_5	q_4



Now q_1 : q_2 (0), q_6 (1) — (NF, F)

q_2 : q_1 (0), q_3 (1) — (NF, F)

III'y (q_1, q_2) (q_3, q_6) (q_4, q_5) these order pairs should not be crossed.

And (q_1, q_4) (q_1, q_5) (q_2, q_4) (q_2, q_5) should be crossed.

Now Transition table is:

δ	0	1
~~(q_1, q_2)~~	~~(q_1, q_2)~~	~~(q_3, q_6)~~
~~(q_3, q_6)~~	~~(q_1, q_2)~~	~~(q_4, q_5)~~
~~(q_4, q_5)~~	~~(q_4, q_4)~~	~~(q_2, q_5)~~

$\Rightarrow$ (q_3, q_5) was already crossed, hence (q_4, q_5) should also be crossed.

Because (q_4, q_5) is crossed $\Rightarrow$ cross (q_3, q_6) also.

Because (q_3, q_6) — " — " — (q_1, q_2) — " —

Hence can't reduce or minimise the given DFA.