* Equivalence of DFA & NFA

There is a DFA_D for any NFA_N i.e., $L(D) = L(N)$.

Two finite acceptors, M_1 & M_2 are said to be equivalent if that is, they both accept the same language.

$L(D) = L(N)$ ✓ equal.

Construction:

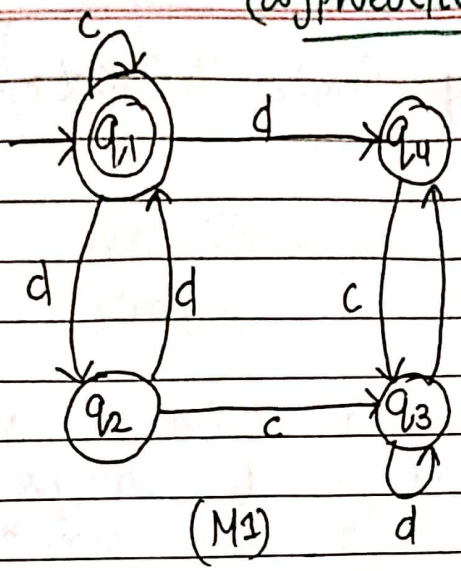
→ In DFA or NFA, whenever an arrow is followed there is a set of possible states. (Set of states is subset of Q).

→ Track the information about subsets of states that can be reached from intial state after following arrows.

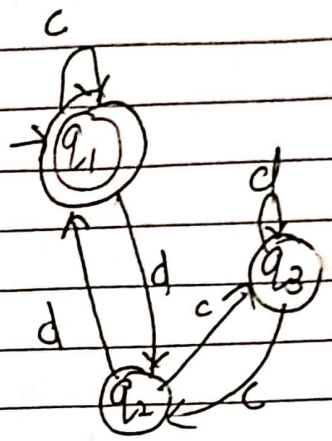
→ Consider each subset of states of NFA as a state of DFA and every subset of states containing a final state as a final state of DFA.

Example Find out the equivalent DFA for the given NFA.

Q.



(M1)



(M2)

Transition Table of NFA

States	c	d
→ q_1	q_1	$\{q_2, q_4\}$
q_2	q_3	q_1
q_3	q_4	q_3
q_4	q_3	$\emptyset$

Transition Table (DFA)

States	c	d
→ q_1	q_1	q_2
q_2	q_3	q_1
q_3	q_2	q_1

→ Same set of input strings
→ Same < Intial state / final state

→ Example

	c	d
$\{q_1, q_2\}$	$\{q_1, q_3\}$	$\{q_2, q_4, q_2\}$

$\{q_1, q_3\}$ → both final state
$\{q_2, q_4, q_2\}$ → all intermidate states

Yes they are equivalent DFA of NFA

Common Table

States	c	d
$\{q_1, q_1\}$	$\{q_1, q_1\}$	$\{q_2, q_4, q_2\}$
$\{q_2, q_2\}$	$\{q_3, q_3\}$	$\{q_1, q_1\}$
$\{q_3, q_3\}$	$\{q_4, q_2\}$	$\{q_3, q_2\}$
$\{q_4\}$	q_3	ϕ

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