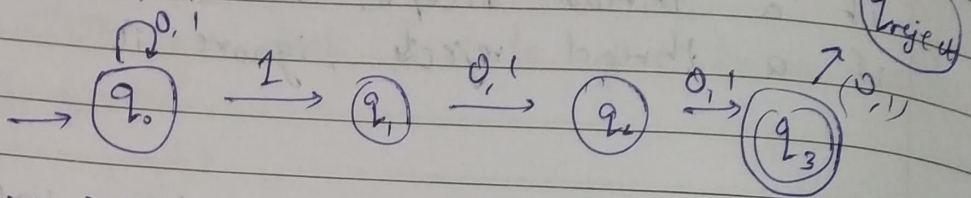
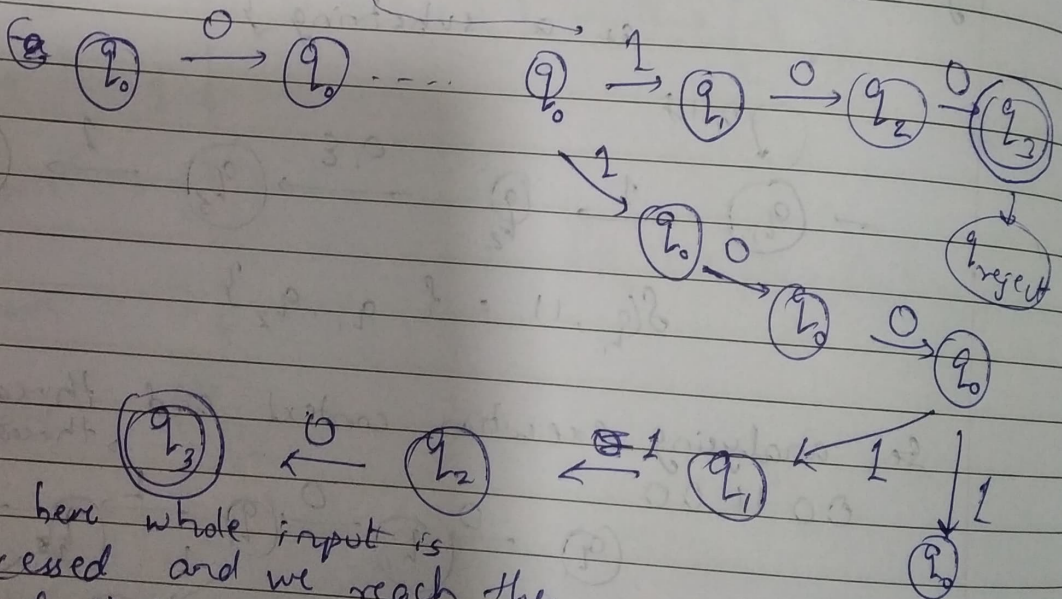


eg.  $L = \{ w \mid w \text{ contains a } 1 \text{ in the third position from the right end} \}$

$$\Sigma = \{0, 1\}$$


$w = 00000100110$



til here whole input is processed and we reach the final state.

If we find any thread reaching final state after processing whole input, the thread is accepted, else rejected

eg.  $\{w \mid w \text{ is of the form } 0^k \text{ where } k \text{ is a multiple of 2 or 3}\}$   
 Note the defn:

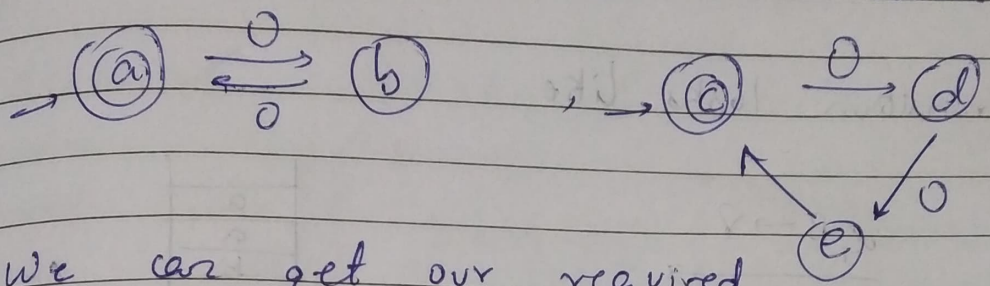
$\Sigma = \{0\}$

$$0^1 = 0$$

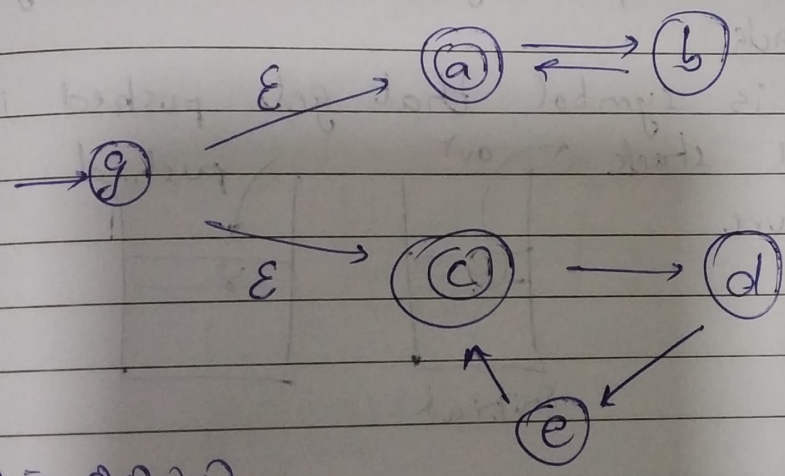
$$0^4 = 0000$$

$$0^6 = 000000$$

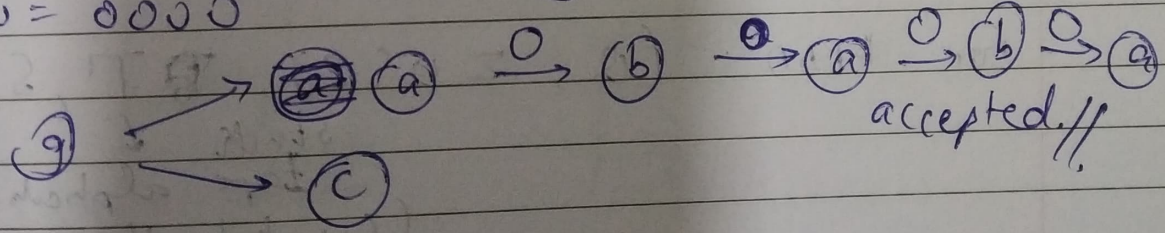
individual machine can be of form



We can get our required machine by combining these two.



$w = 00000$



NFA why?

because  $\delta(q, \epsilon) = \{a, c\}$

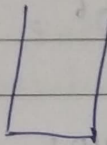
transitions  $\epsilon$  can be used connect "or" machines



## Another Machine

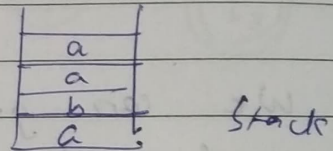
DPDA

Deterministic Push Down Automata

Automata +  Stack (LIFO)

Transition looks like

$\alpha, B \rightarrow \gamma$



$\alpha$  is input symbol,  $B$  is top symbol on stack.  
 $\gamma$  is symbol that gets pushed into stack

Final stack ← out

Figure

initial

pushed

For DPDA:  $(Q, \Sigma \cup \{\epsilon\}, \Gamma, \delta, q_0, F)$

stack  
 ↓  
 tape alphabet  
 (symbols that can be added into stack)

$\delta: Q \times (\Sigma \cup \{\epsilon\}) \times (\Gamma \cup \{\epsilon\}) \rightarrow Q \times (\Gamma \cup \{\epsilon\})$

↓ initial state

↓ input alphabet

stack ↓ tape alphabet  
 B read

↓ stack  
 tape alphabet written  $\gamma$

## acceptance criteria

- end up in a state  $\epsilon F$
- read entire input  $w$
- empty the stack.  
(initially / at starting it is provided empty)

eg  $L(M) = \{ 0^n 1^n \mid n \geq 0 \}$

0011 ✓

00001111 ✓

001111 X

as per observation

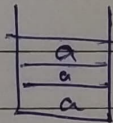
\* stack is used to count the amount of

0's, 1's  $T = \{a\}$

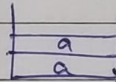
consumed.

which is unknown in DFA, NFA.

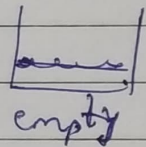
If  $w = 000111$



$q_0 \rightarrow q_1$

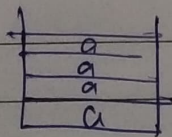


$q_1$  finally  
empty

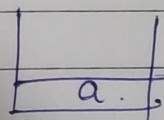


core of this machine looks at last for final machine.

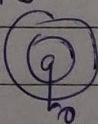
If  $w = 00001111$



at end



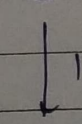
$T = \{a, \$\}$



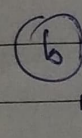
$\epsilon, \epsilon \rightarrow \$$



$0, \epsilon \rightarrow a$



$1, a \rightarrow \epsilon$



$\epsilon, \$ \rightarrow \epsilon$

$\$$  is used to identify the end of stack sort of.

final machine.