Example 1: This is a TEXfile.

$$(f * g) = \int_{-\infty}^{\infty} f\tau g(t-\tau)\, d\tau$$

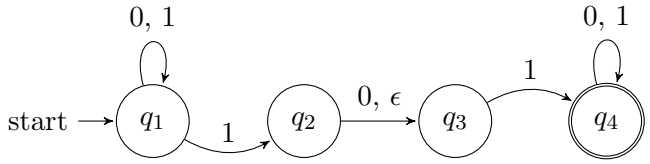
Example 2: *As NFA defined on Page 54 of ITC* textbook.

$Q = \{q_1, q_2, q_3, q_4\}$
$\sum = \{0, 1\}$
$F = \{q_4\}$
$q_0 = q_1$
$\delta = \{((q_1, 0), \{q_1\}), ((q_1, 1), \{q_1, q_2\}), ((q_1, \epsilon), \phi),$
$((q_2, 0), \{q_3\}), ((q_2, 1), \phi), ((q_2, \epsilon), \{q_3\}),$
$((q_3, 0), \phi), ((q_3, 1), \{q_4\}), ((q_3, \epsilon), \phi),$
$((q_4, 0), \{q_4\}), ((q_4, 1), \{q_4\}), ((q_4, \epsilon), \phi)\}$

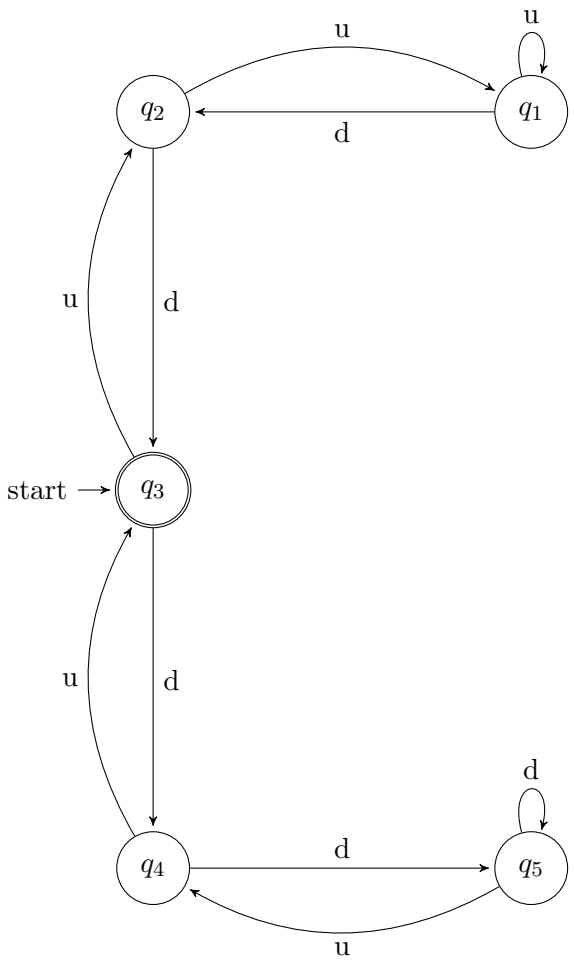
Transition Function in Table form:

| | 0 | 1 | $\epsilon$ |
|---|---|---|---|
| $q_1$ | $\{q_1\}$ | $\{q_1, q_2\}$ | $\phi$ |
| $q_2$ | $\{q_3\}$ | $\phi$ | $\{q_3\}$ |
| $q_3$ | $\phi$ | $\{q_4\}$ | $\phi$ |
| $q_4$ | $\{q_4\}$ | $\{q_4\}$ | $\phi$ |

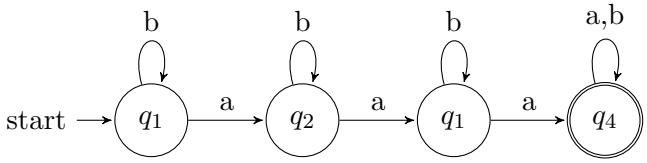
NFA in pictorial form:



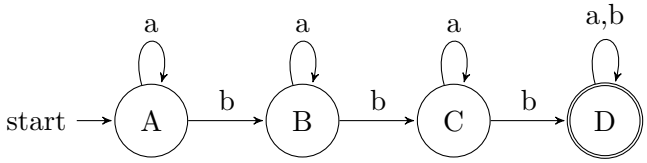

Example 3: ***DFA, state diagram of machine M***



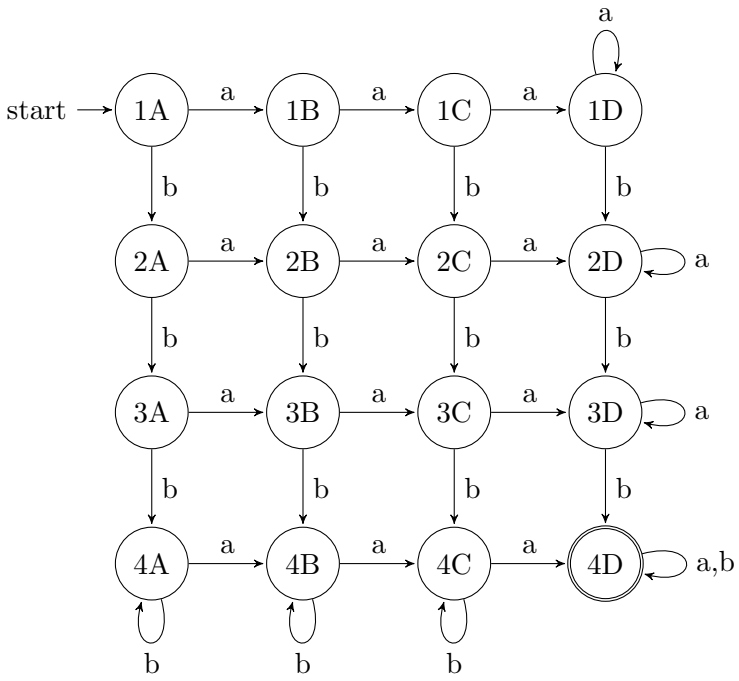

Example 4: **Machine DFA has 02 languages and it combine:**
{w| w has at least three a's}




{w| has at least three b's}



Combining them using the intersection construction for DFA machine:




Regular expression and it diagram DFA: $\mathbf{1}\sum^{*}\mathbf{0}$
**{w|w begin with a 1 and end with a 0}**