FA	NFA	TG
no relaxation	2 relaxation [1 and 2 only]	4 relaxations 1) Δ - transitions 2) non-determinism 3) multiple start states 4) multiple letters on edge

[RE to FA conversion]

a) RE → NFA

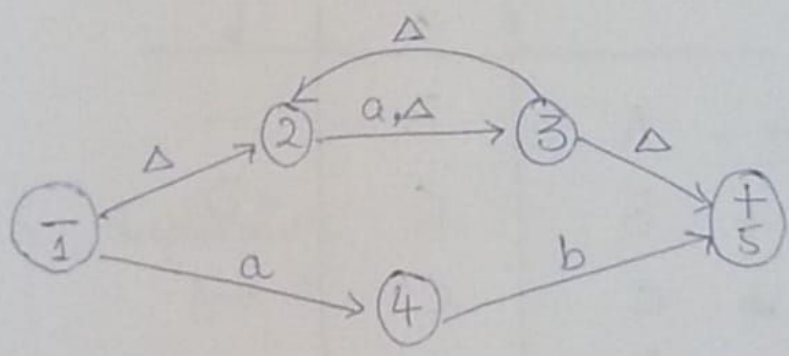
b) NFA → FA

c) FA → minimized FA

FA = DFA

Ex : 1 $a^* + ab$

a) RE → NFA



b) NFA to FA :

λ - closure {1} = {1, 2, 3, 5} — (A) +

$goto\,set_a(A) = \{3, 4\}_{(B)}$

$goto\,set_b(A) = \{\}$

λ - closure $\{3,4\} = \{3,4,5,2\}$ — $(\overset{B}{+})$

$\text{gotoset}_a(B) = \{3\}_{(C)}$

$\text{gotoset}_b(B) = \{5\}_{(D)}$

λ - closure $\{3\} = \{3,2,5\}$ — $(C+)$

$\text{gotoset}_a(C) = \{3\}_{(C)}$

$\text{gotoset}_b(C) = \{\}$

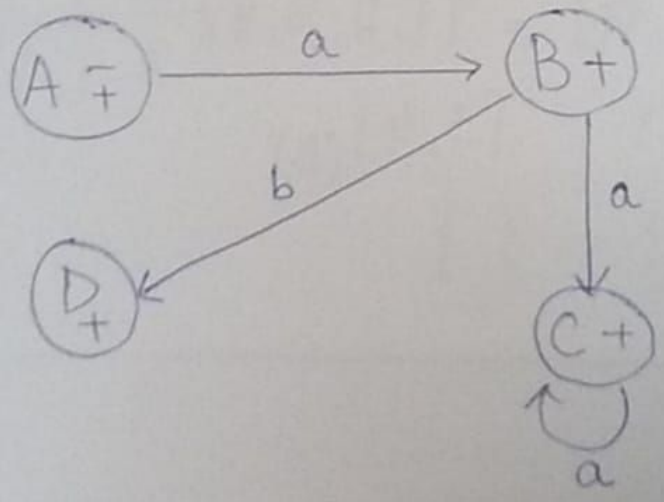
λ - closure $\{5\} = \{5\}$ — $(D+)$

$\text{gotoset}_a(D) = \{\}$

$\text{gotoset}_b(D) = \{\}$

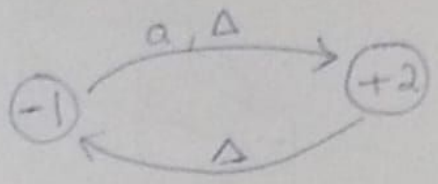
---

		a	b
+-	A	B	—
+	B	C	D
+	C	C	—
+	D	—	—



Ex 2: a^*

a) RE → NFA



b) NFA → FA

λ-closure {1} = {1, 2} — (A)

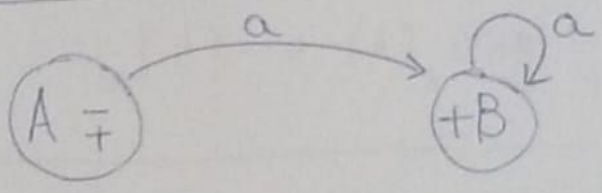
$goto_a(A) = \{2\}_{(B)}$

λ-closure {2} = {2, 1} — (B)

$goto_a(B) = \{2\}_{(B)}$

---

		a
∓	A	B
+	B	B



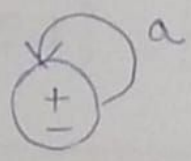
c) NFA → minimized FA

		a
∓	A	B A
+	B	B

} duplication A = B

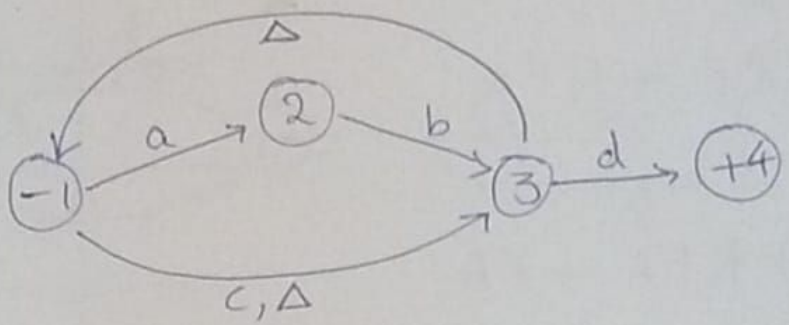
⇒

		a
±	A	A



Ex 3: $(ab+c)^* d$

a) RE → NFA



b) NFA → FA

λ- closure {1} = {1, 3} — (A)

$goto_a(A) = \{2\}_B$

$goto_b(A) = \{\}$

$goto_c(A) = \{3\}_A$

$goto_d(A) = \{4\}_C$

λ- closure {2} = {2} — (B)

$goto_a(B) = \{\}$

$goto_b(B) = \{3\}_A$

$goto_c(B) = \{\}$

$goto_d(B) = \{\}$

λ- closure {3} = { , } — (A)

λ- closure {4} = {4} — (C+)

$goto_a(C) = \{\}$ $goto_c(C) = \{\}$

$goto_b(C) = \{\}$ $goto_d(C) = \{\}$

		a	b	c	d
−	A	B	−	A	C
	B	−	A	−	−
+	C	−	−	−	−

[Already minimized]