Moorey machine

State	0	1	Output
→.A	B	A	b
B	B	C	b
C	B	A	a

Meelay machine
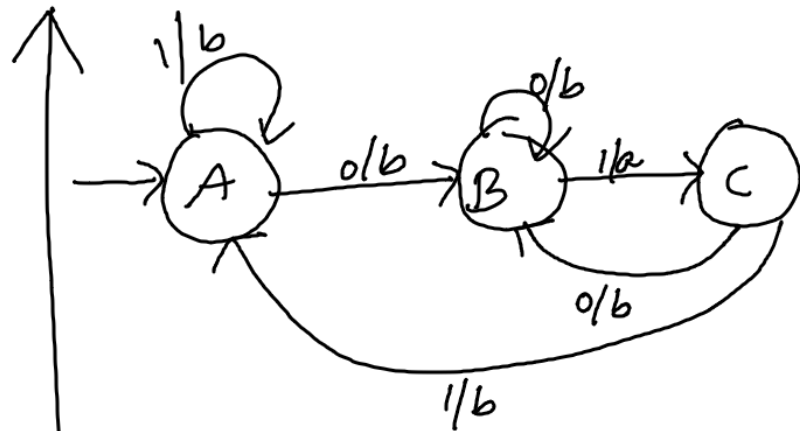
State	0	1
→A	B,b	A,b
B	B,b	C,a
C	B,b	A,b

q_0 →
$0/x$ → q_1,x
$0/x$ (self loop on q_1)
$1/y$
$1/y$
$0/x$
q_2,y
$1/y$
$0/\phi$

Moorey Mach
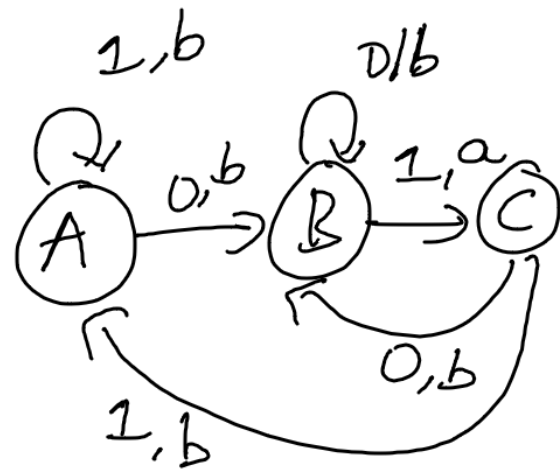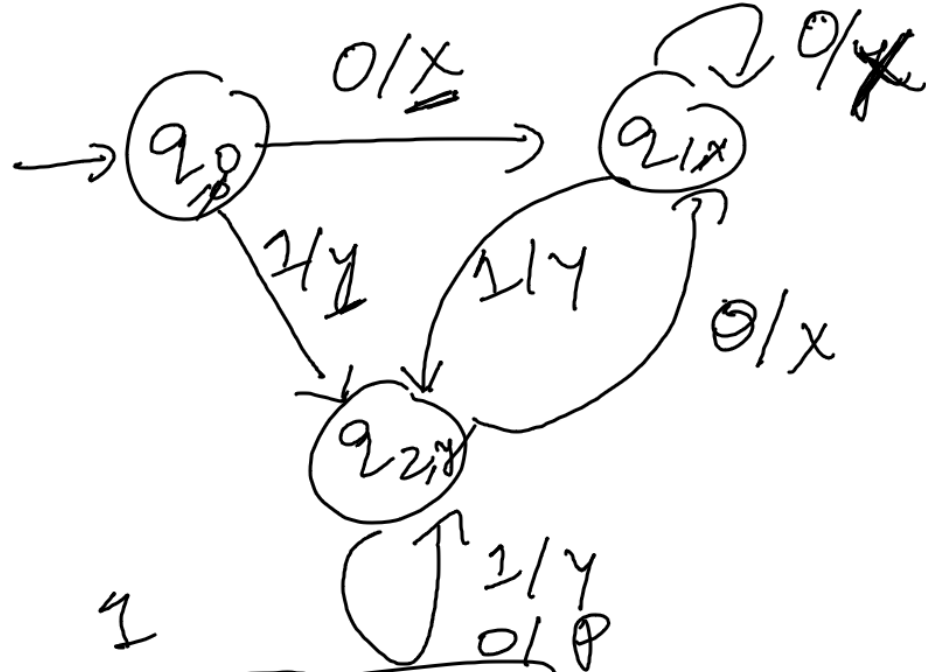
	0	1	o/p
q_0	q_1	q_2	ϕ
q_1	q_1	q_2	X
q_2	q_1	q_3	Y

	0	1	o/p
q_0	q_1,X	q_2,y	ϕ
q_1	q_1,X	q_2,y	X
q_2	q_1,X	q_2,y	Y

Minimization of DFA
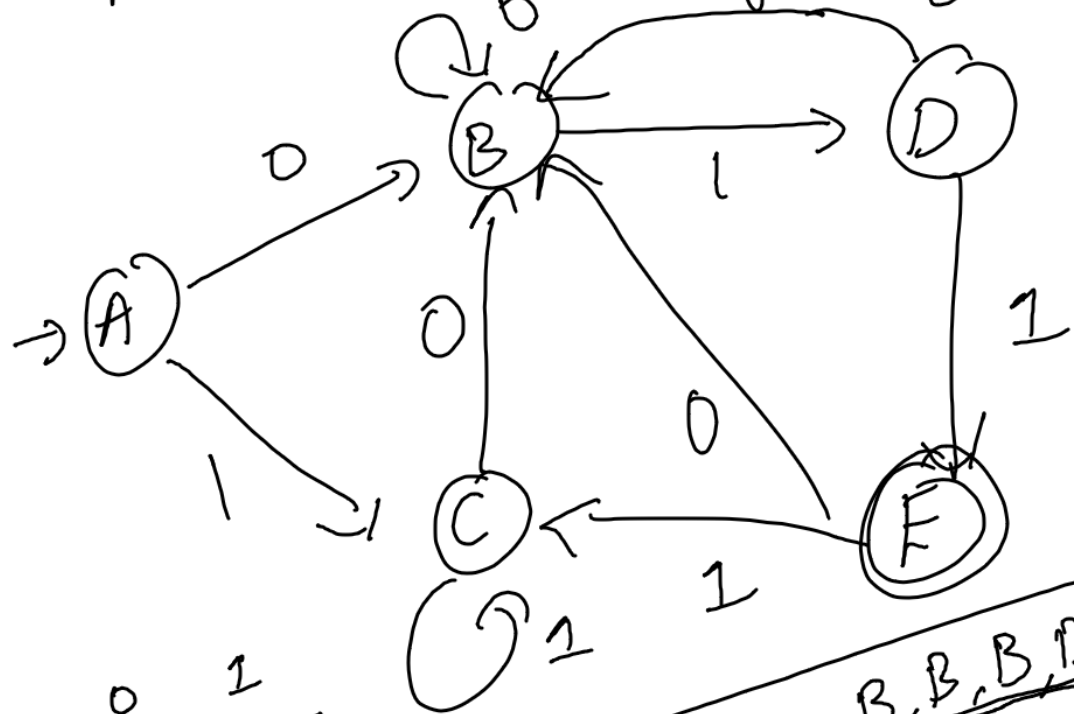
	0	1
A	B	C
B	B	D
C	B	E
D	B	E
E	B	C

A → B, B, B, B

A → C, D, C, E

A, C → B
A, C → C

A, B, C → B, B, B
A, B, C → C, D, C

0-Equivalent
$\{A, B, C, D\}$, $\{E\}$

1-Equivalent
~ $\{A, B, C, D\}$, $\{E\}$
≈ $\{A, B, C\}$ $\{D\}$ $\{E\}$

2-Equivalent
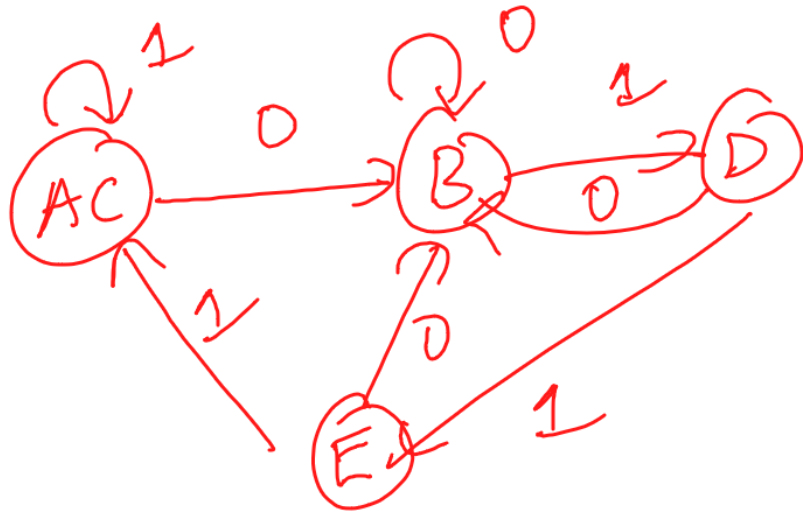~ $\{A, B, C\}$ $\{D\}$ $\{E\}$
≈ $\{A, C\}$ $\{B\}$ $\{D\}$ $\{E\}$

3-Equivalent
= $\{A, C\}$ $\{B\}$ $\{D\}$ $\{E\}$
= $\{A, C\}$ $\{B\}$ $\{D\}$ $\{E\}$

$\{ AC, B, D, E \}$

	0	1
A	B	F
B	G	C
C	A	C
D	C	G
E	H	F
F	C	G
G	G	E
H	G	C

0 – Equivalent

$\{A, B, D, E, F, G, H\}, \{C\}$ ✓

1 – Equivalent

$\{A, B, E, G, H\} \{D, F\}, \{C\}$ ✓

$\{A, E\} \{B, H\} \{G\}, \{D, F\}, \{C\}$ ✓

2 – Equivalent

✓ $C \sim \{A, E\} \{B, H\} \{G\} \{D, F\} \{C\}$

✓ $\sim \{A, E\} \{B, H\} \{G\} \{D, F\} \{C\}$

AE, BH, G, DF, C

$\{A, B, P, E, F, G, H\} \{C\}$ ✓

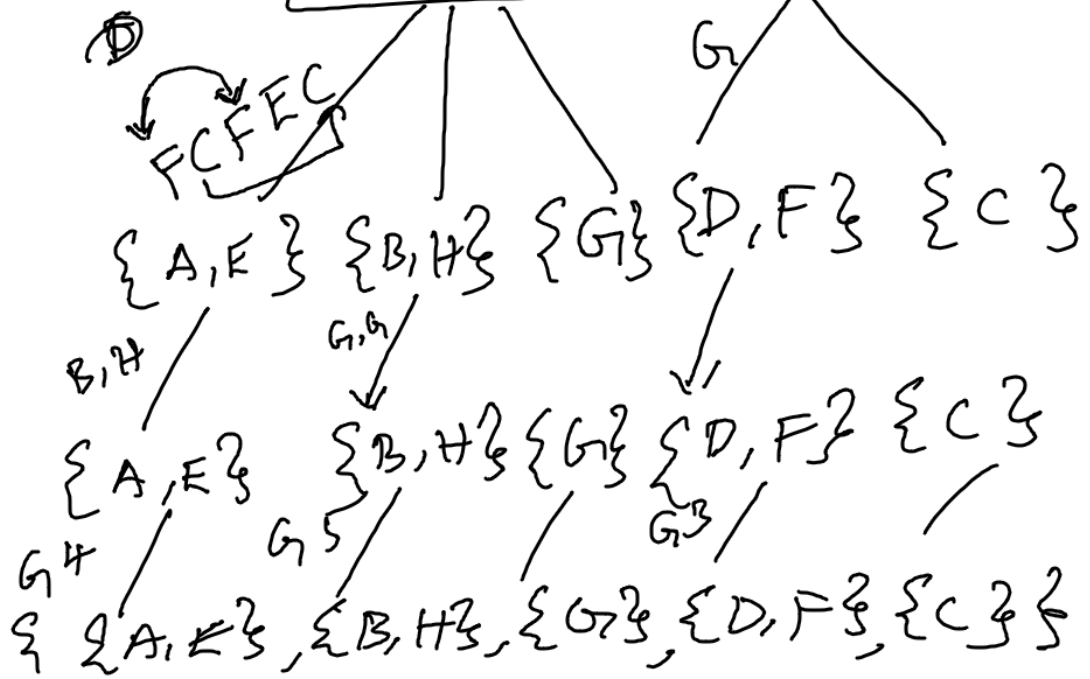$\{A, B, D, E, F, G, H\}$ — 0 — $\{B, G, C, H, C, G, G\}$

1

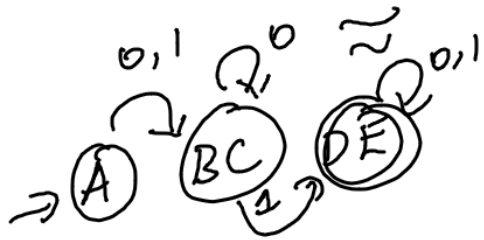$\boxed{A, B, E, G, H} \boxed{D, F} \boxed{C}$

$A, B, E, G, H \xrightarrow{1}$

Ⓓ FCFEC

$\{A, E\} \{B, H\} \{G\} \{D, F\} \{C\}$

$\{A, E\}$ B,H G,G $\{B, H\} \{G\} \{D, F\} \{C\}$

G4 $\{A, E\}$ G5 G3

$\{\{A, E\}, \{B, H\}, \{G\}, \{D, F\}, \{C\}\}$

	0	1
→A	B	C
B	C	D
C	B	E
→D	D	D
→E	E	E

	0	1
→A	BC	BC
BC	BC	DE
→DE	DE	DE

0-Equivalent

$\{A, B, C\}, \{D, E\}$

1-Equivalent

$\{A, B, C\}, \{D, E\}$

$\sim$ $\underline{\{A,B,C\}}, \{D,E\}$

$\tilde{\sim}$ $\{A\}, \underline{\{B,C\}}, \{D,E\}$

2-Equivalent

$\sim$ $\{A\}, \{B,C\}, \{D,E\}$

$\approx$ $\{A\}, \{B,C\}, \{D,E\}$

$\{A, BC, DE\}$

Pumping Lemma :-

If A is Regular Langge, then A has a pumping length P such that any string s where $|s| \geq P$ may be divided into 3 parts $s = xyz$

(1) $xy^i z \in A$ for $i \geq 0$

(2) $|y| > 0$

(3) $|xy| \leq P$

(2) $|y| > 0$

(3) $|xy| \leq 4$

Q. $A = \{a^n b^n\}$

let P be pumping lgth

$A = a^P b^P$

let $P = 4$

$A = a^4 b^4$

$S = \{\underline{aaaaa}bbbb\}$

$\qquad\qquad \downarrow \quad \downarrow$
$\qquad\qquad x \quad y \quad z$

$x = aa, \quad y = aa$

$z = bbbb$

let $i = 2$

$x \, y^2 \, z$

$x \, y \, y \, z$

$\underbrace{aa}\,\underbrace{aa}\,aa\,\underline{bbbb}$

$\therefore$ A is not Regular

---

⑤ Apply pumping lemma for Lange $L = \{ a^n / n \text{ is prime} \}$ and prove its not regular.

$$\boxed{L = a^n}$$

Let P be pumping lgth

$L = a^P$

let $P = 5$

$L = a^5$

$L = a$

$S = \underbrace{aa}_{x}\,\underbrace{a}_{Y}\,\underbrace{aa}_{Z}$

$x = a$
$y = aa$
$z = aa$

$x y^i z$ $i = 2$

$x y y z$

$\boxed{a\,aaaaaa}$ $2t$

$x\,y\,y\,y\,z$ $i = 3$

$a\,aaaaaa\,aa$

∴ L is not Regular.

$S = aaaa\,a\,a$

$x = aaa$, $y = a$, $z = a$

$x y^i z$ $i = 2$

$x\,y\,y\,z$

$aaa\,aa\,a$