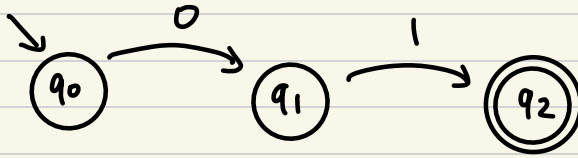
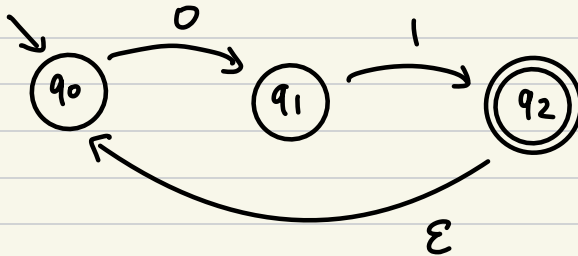


1) (a)



(b)



2)

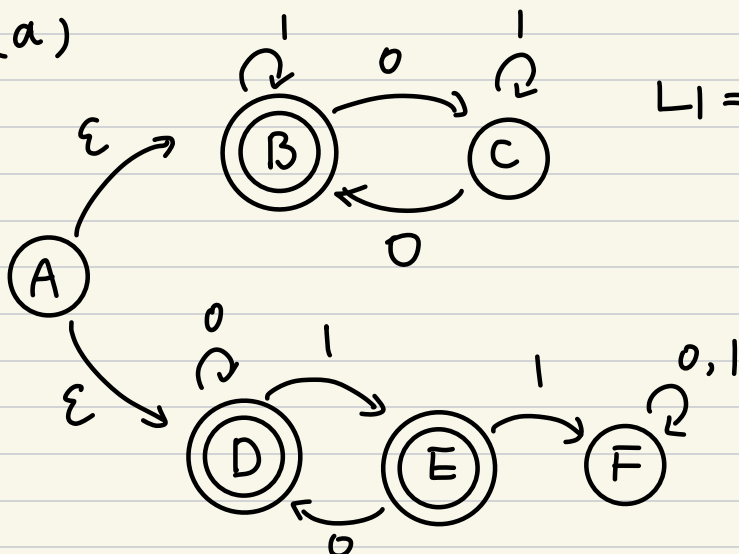
$$L4 \cdot L5 = \{ 111, 101, 0011, 0001, 0111, 0101 \}$$

$$L4 \cdot L5 = \{ w \mid w = u \cdot v, u \in L4, v \in L5 \}$$

$L_4 = \{w \mid w \text{ has even amount of } 0's\}$

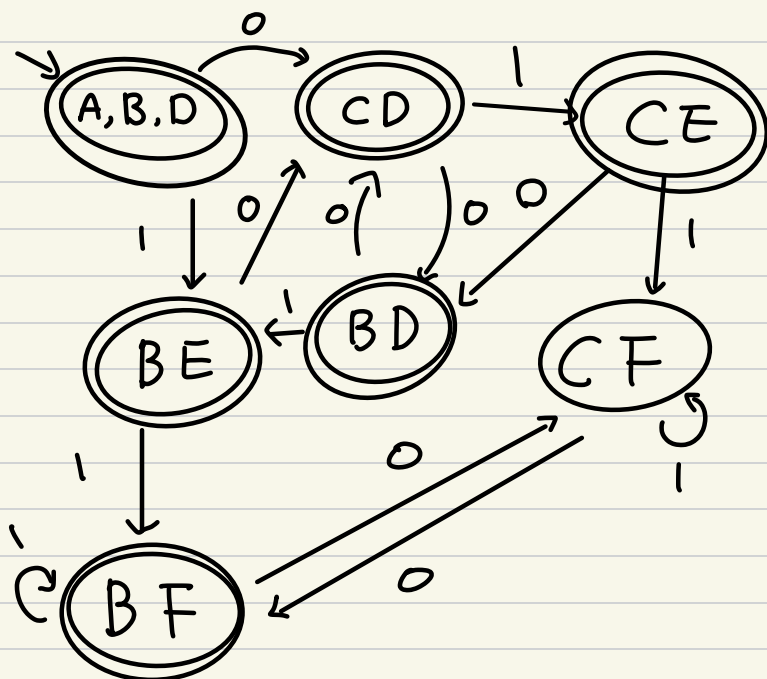
3) $L_5 = \{w \mid w \text{ doesn't contain substring } 11\}$

(a)



$$L_1 = L_4 \cup L_5$$

(convert NFA to DFA)



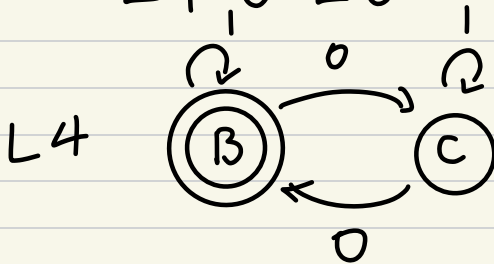
	0	1
A,B,D	C,D	B,E
C,D	B,D	C,E
B,E	C,D	B,F
B,D	C,D	B,E
C,E	B,D	C,F
B,F	C,F	B,F
C,F	B,F	C,F

(b) $L_4 = \{w \mid w \text{ has even amount of } 0\}$

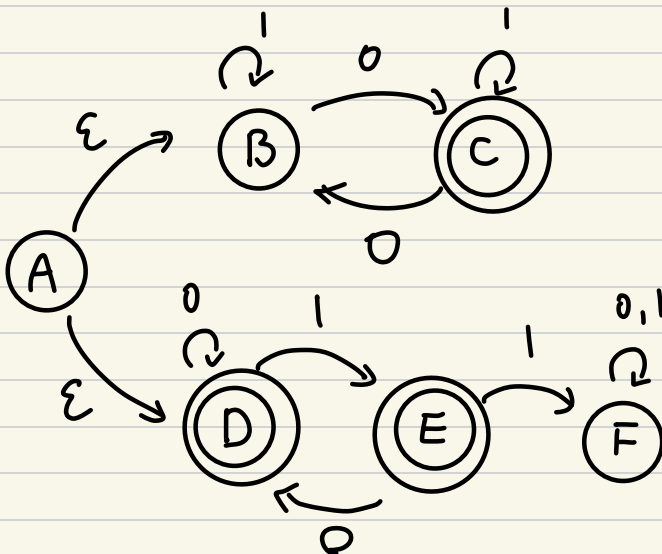
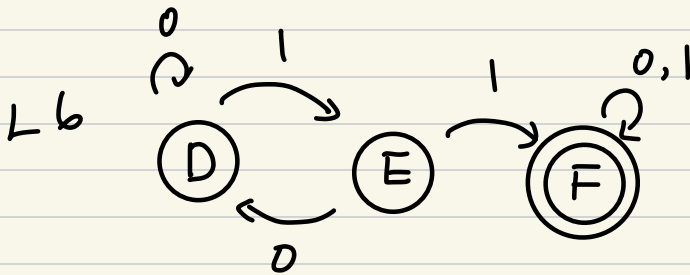
$L_6 = \{w \mid w \text{ contains substring } 11\}$

$$L_2 = L_4 \cap L_6$$

$$= \overline{L_4 \cup L_6}$$

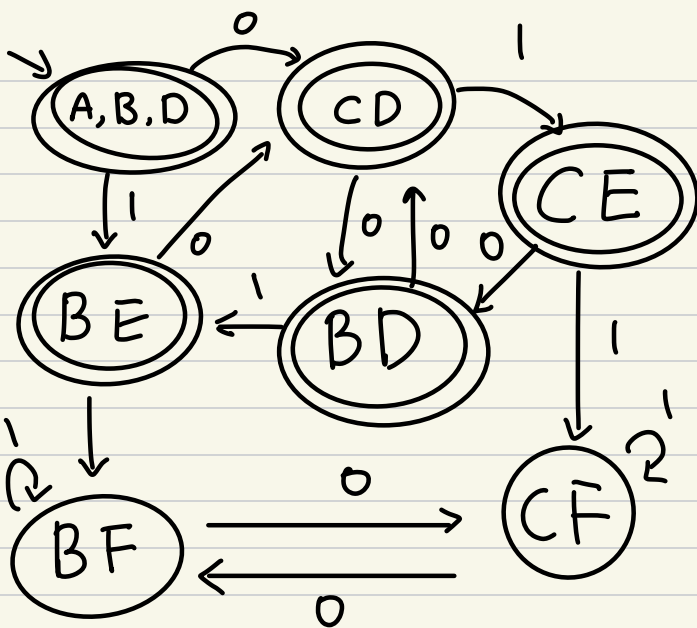


$$L_1 = L_4 \cup L_5$$



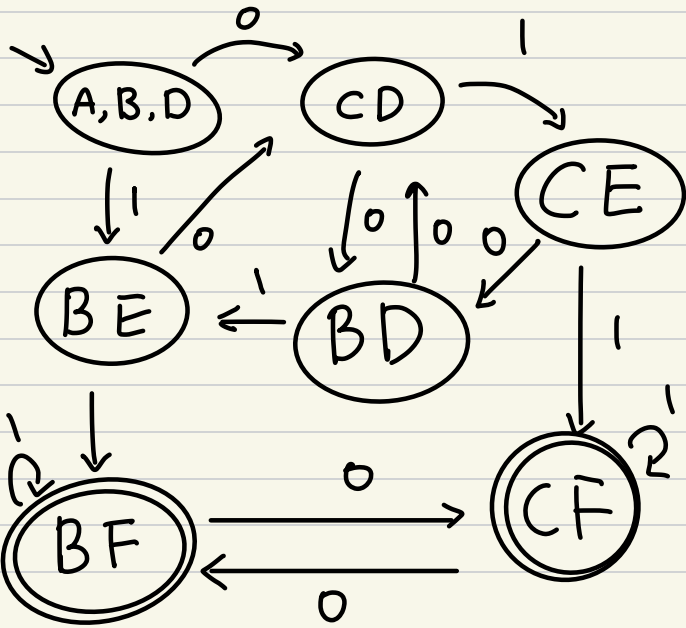
$$\overline{L_4 \cup L_6}$$

Convert NFA to DFA



	0	1
ABD	CD	BE
CD	BD	CE
BE	CD	BF
BD	CD	BE
CE	BD	CF
BF	CF	BF
CF	BF	CF

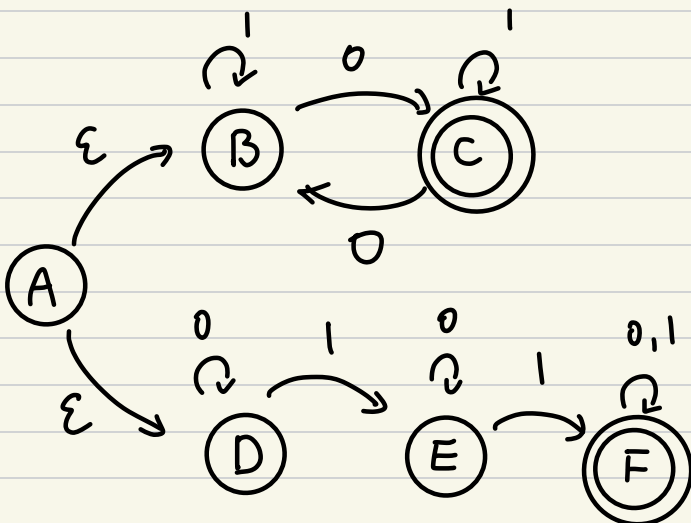
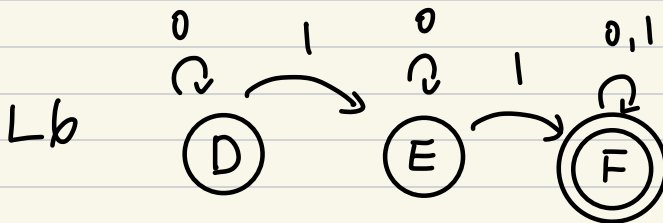
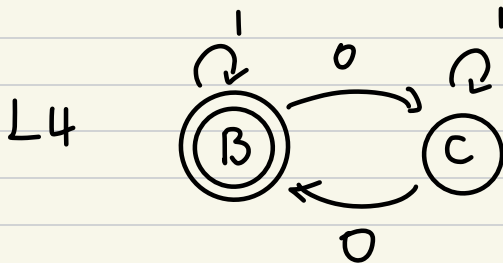
\Downarrow
L4U L6



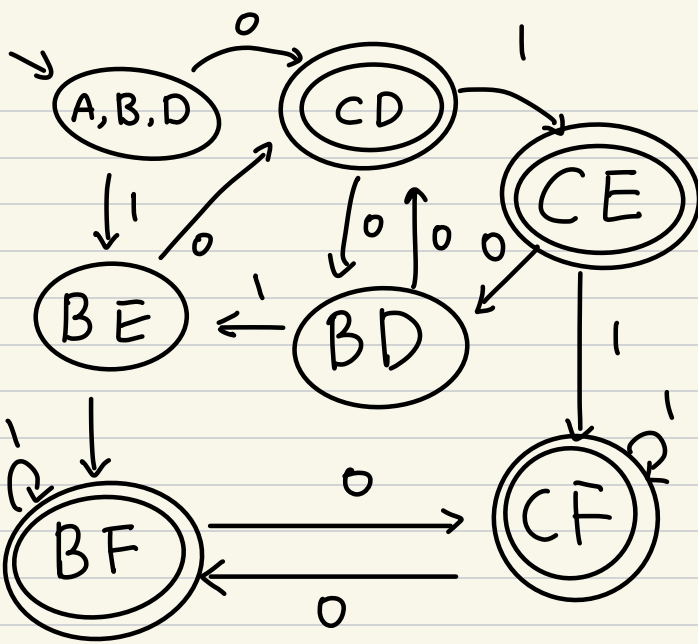
(C) $L_4 = \{w \mid w \text{ has even amount of } 0\}$

$L_6 = \{w \mid w \text{ contains substring } 11\}$

$$L_3 = L_4 \cap \overline{L_6} = \overline{\overline{L_4} \cup L_6}$$



$\overline{L_4} \cup L_6$



	0	1
ABD	CD	BE
CD	BD	CE
BE	CD	BF
BD	CD	BE
CE	BD	CF
BF	CF	BF
CF	BF	CF

\Downarrow

 L4 U L6

