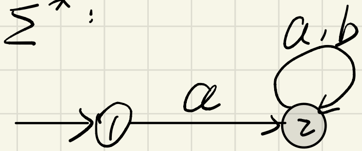
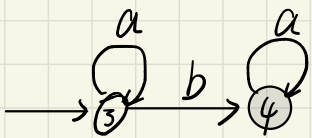
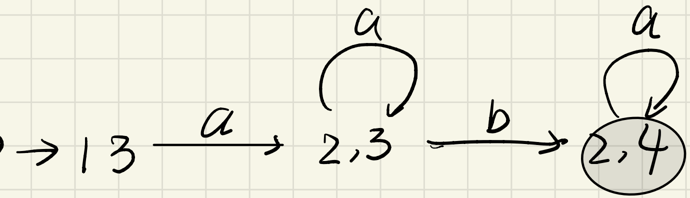
1. (e) ① $a\Sigma^*$:



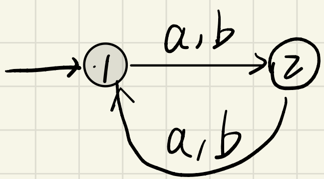
② a^*ba^*



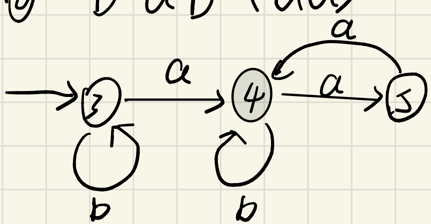
$\Rightarrow$



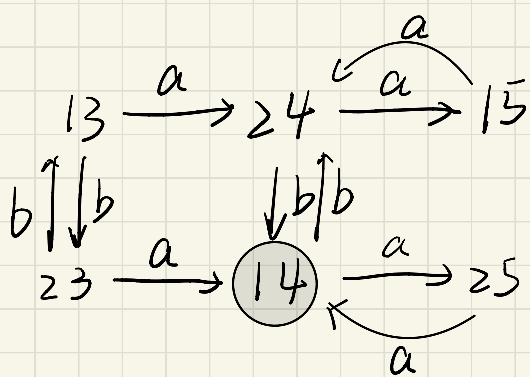
(g) ① $((a+b)(a+b))^*$



② $b^*ab^*(aa)^*$

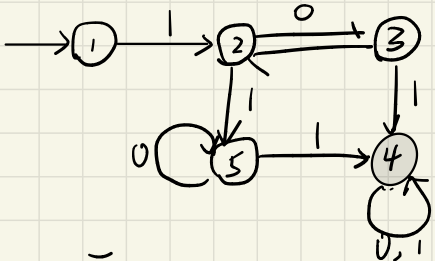


$\Rightarrow$

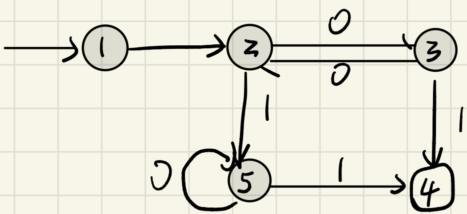


2.

DFA for $\overline{F}$:



DFA for F:



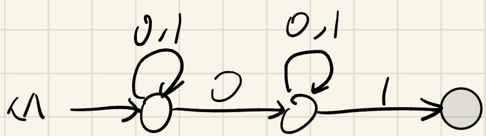
3.

a. $M=(Q,\Sigma,\delta,q_0,F)$

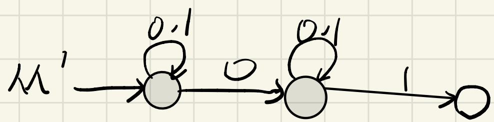
$M'=(Q,\Sigma,\delta,q_0,Q-F)$

对于$w=a_1\cdots a_n$且$w\in M$，则w一定停在$q\in F$上；对于$\overline{w}\notin M$，则$\overline{w}$一定停在$q\in Q-F$上，因此M'识别$\overline{B}$ (Σ^*-B)

b.

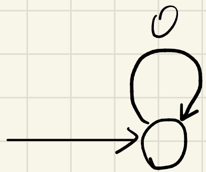


识别B $(\Sigma^*0\Sigma^*1)$

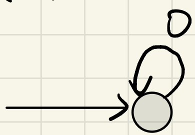


不识别$\overline{B}$ （01也在M'中）

4. 考虑 L 为空语言，则有 N 识别 L；



有 N，为



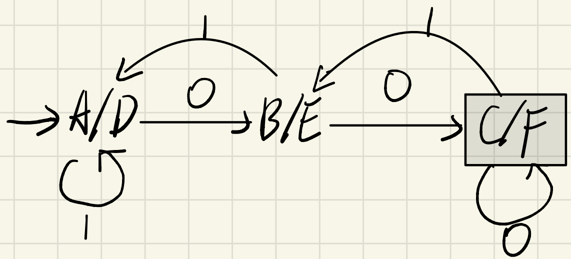
识别 $0^* \neq \phi$ 得证.

5. initialize:

	0	1
~~A B~~	B|C	
~~A C~~	B|F	
A D	B|E	A|A
~~A E~~	B|F	
~~B D~~	C|E	
B E	C|F	D|D
C F	F|F	B|E
~~D E~~	E|F	

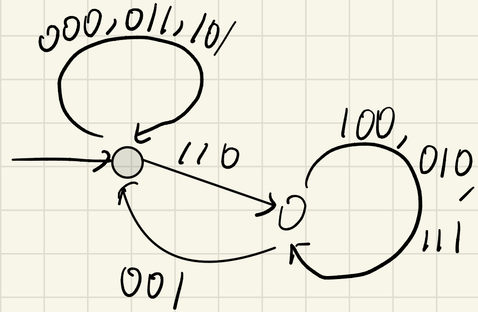
$\therefore A \equiv D,\ B \equiv E,\ C \equiv F$

$\Rightarrow$



6. B is regular $\Leftrightarrow$ B^R is regular. So prove B^R is regular.

that is to find a FA $L(Q, \Sigma, \delta, q_0, F)$ that recognizes B.



Note that every arc is denoted by transpose of the "letter".

Proven.

7. $\begin{bmatrix}1\\0\end{bmatrix}\begin{bmatrix}0\\1\end{bmatrix}\begin{bmatrix}1\\0\end{bmatrix}\begin{bmatrix}0\\1\end{bmatrix}$

Assume D to be regular, then there is a pumping length n.

For any given $w \in D$ and $|w| > n$, $w = xyz$ where $|xy| \leq n$.

Let w be $\begin{bmatrix}1\\0\end{bmatrix}^n \begin{bmatrix}0\\1\end{bmatrix}^n$, thus $y = \begin{bmatrix}1\\0\end{bmatrix}^i$ where $0 < i \leq n$

So $xy^3z = \begin{bmatrix}1\\0\end{bmatrix}^n \begin{bmatrix}1\\0\end{bmatrix}\begin{bmatrix}1\\0\end{bmatrix}\begin{bmatrix}0\\1\end{bmatrix}^n \notin D$.

Contradiction.