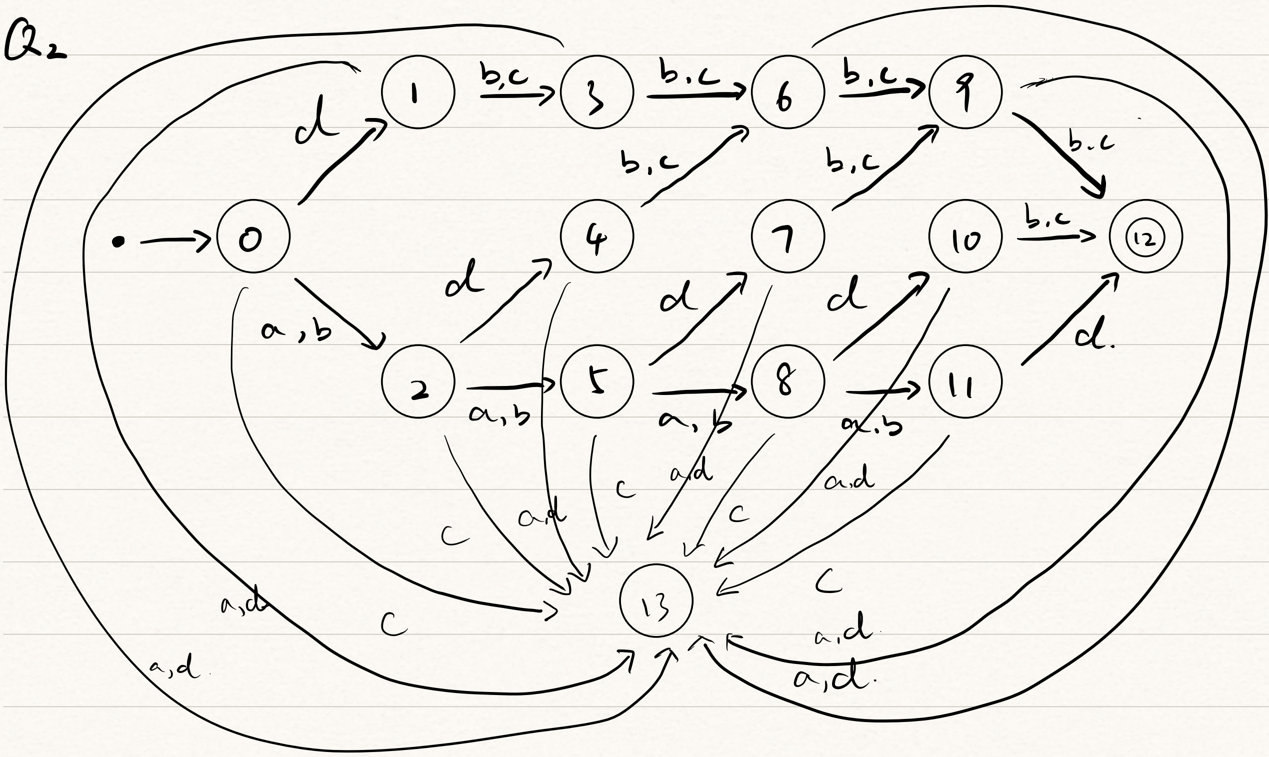
Q1 (a) $\forall w \in L_1$, since $L_1 \subseteq L_2$, then $w \in L_2$. Then $\forall v \in L_1^*$, v must be like $w_1 w_2 \cdots w_n$ where $n > 0$ and $w_n \in L_1$, so for all words w_n that made up of v, $w_n \in L_2$ by definition, so $w_1 w_2 \cdots w_n \in L_2^*$. Thus, $v \in L_2^*$. $\forall v \in L_1^*$, $v \in L_2^*$. So $L_1^* \subseteq L_2^*$

(b) Disprove. Assume that $L_1 = \{aa\}$, $L_2 = \{a\}$. L_1^* could only contain words that are made up from even number of a while L_2^* contains words have random number of a, so $L_1^* \subseteq L_2^*$. However, it is obvious that $L_1 \not\subseteq L_2$.

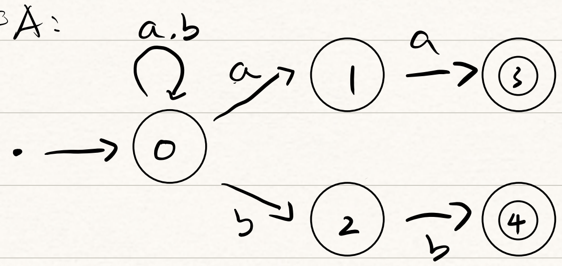
Q2



For every stage that end with a,b, it would continue with either d or a,b, stages end with b,c,d could only continue with b,c.

Q3.

NFA:



DFA: