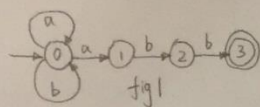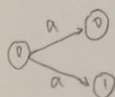**Q1** (1) For the case without ε, for example

fig1

At first sight, we may take it as an DFA, because there is no ε in this figure. But, it is still an NFA. We have two reasons to explain.

① we can draw the Move Table for it

|	a	b
0	{0,1}	{0}
1	∅	{2}
2	∅	{3}
3	∅	∅

We can see, when the NFA is in state 0 and reads input symbol a, it can move two different states: 0 or 1. So you have two choices about which state you can go to. So it is nondeterministic.

② If we don't want to draw the Move Table, we can also find that this is an NFA. Because from the fig1, we can find:
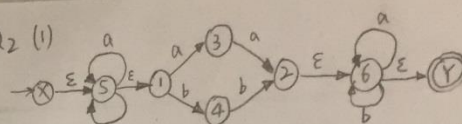

That means, for the state 0, when inputting a same symbol a, there are two states you can go to. So it is nondeterministic.

(2) For the case with symbol ε, for example,
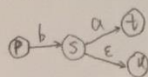
because ε is empty string, that means nothing needs to be input, we still can jump from state s to state u. Also, If we input symbol b in state p, it can jumple to state s as well as state u, that is nonderterministic.
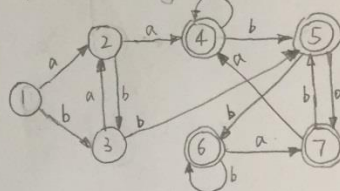
Q2 (1)

First. $S = \{X,1,2,3,4,5,Y\}$ $\Sigma = \{a,b,\varepsilon\}$ $S_0 = X$ $F = \{Y\}$

I	I_a	I_b
{X,5,1} ①	{5,3,1} ②	{5,4,1} ③
{5,3,1} ②	{5,2,3,1,6,Y} ④	{5,4,1} ③
{5,4,1} ③	{5,3,1} ②	{5,2,4,1,6,Y} ⑤
{5,2,3,1,6,Y} ④	{5,2,3,1,6,Y} ④	{5,4,6,1,Y} ⑤
{5,4,6,1,Y} ⑤	{5,3,6,1,Y} ⑦	{5,2,4,1,6,Y} ⑥
{5,2,4,1,6,Y} ⑥	{5,3,6,1,Y} ⑦	{5,2,4,1,6,Y} ⑥
{5,3,6,1,Y} ⑦	{5,2,3,1,6,Y} ④	{5,4,6,1,Y} ⑤

Then we can get

(2) Do it by yourself.