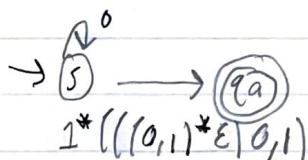
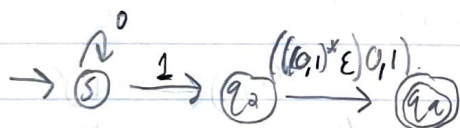
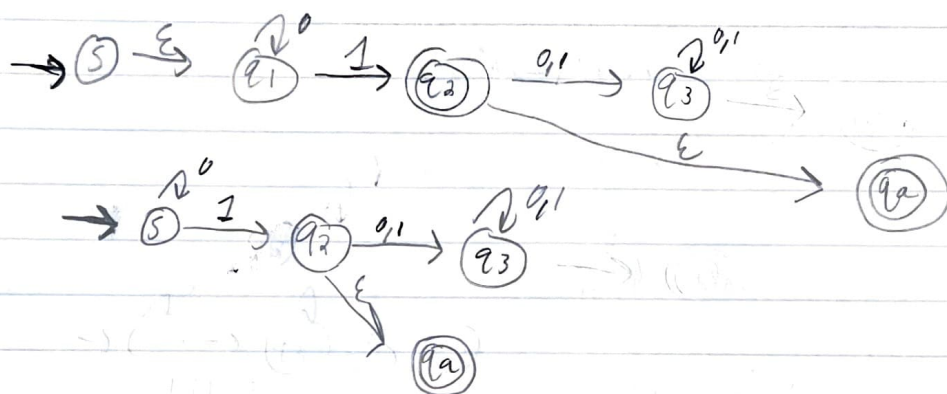
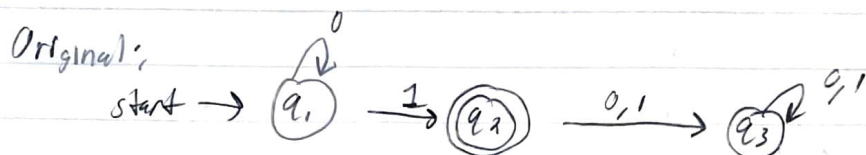


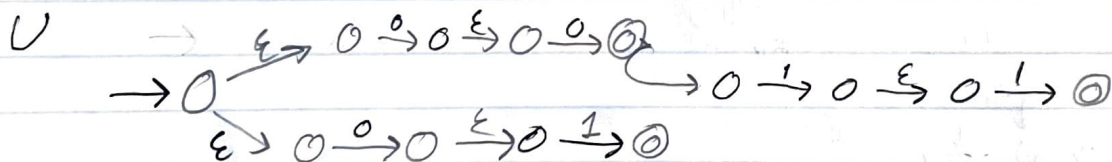
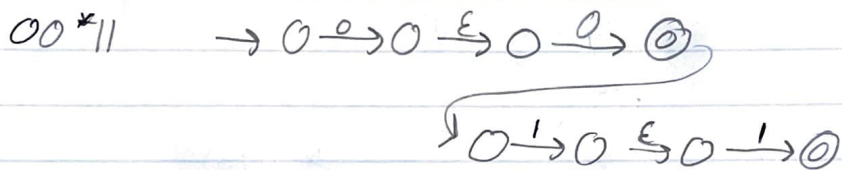
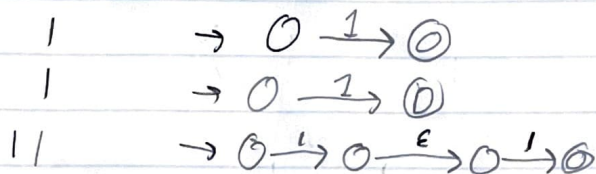
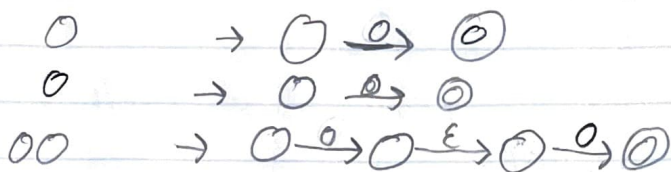
Kush Patel

### HW #3

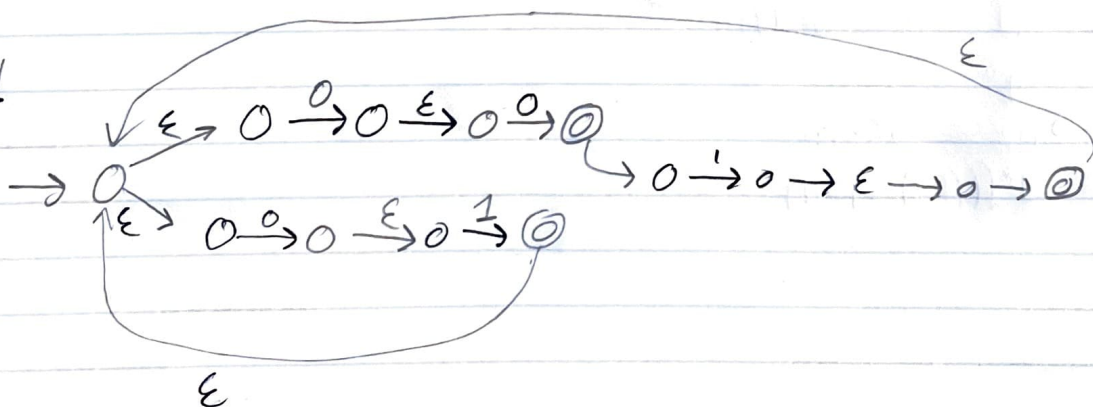
- 1.) First create a GNFA then applying "rip operations" to arrive at a regular expression



2.) Convert the reg. exp  $((00)^*(11) \cup 01)^*$  to a NFA



Final



3.)  $aba \cup bab$ , give two strings that are in the language and two strings that are not

$aba \rightarrow 0 \xrightarrow{a} 0 \xrightarrow{\epsilon} 0 \xrightarrow{b} 0 \xrightarrow{\epsilon} 0 \xrightarrow{a} \odot$   
 $bab \rightarrow 0 \xrightarrow{b} 0 \xrightarrow{\epsilon} 0 \xrightarrow{a} 0 \xrightarrow{\epsilon} 0 \xrightarrow{b} \odot$

$aba \cup bab$   
 $\rightarrow \begin{array}{l} \xrightarrow{\epsilon} 0 \xrightarrow{a} 0 \xrightarrow{\epsilon} 0 \xrightarrow{b} 0 \xrightarrow{\epsilon} 0 \xrightarrow{a} \odot \\ \xrightarrow{\epsilon} 0 \xrightarrow{b} 0 \xrightarrow{\epsilon} 0 \xrightarrow{a} 0 \xrightarrow{\epsilon} 0 \xrightarrow{b} \odot \end{array}$

In language:  $bab$  and  $aba$   
 Not in language:  $bbb$  and  $aaa$

4.) Prove that the following lang.  $L$  is not regular

$$L = \{ a^n b a^m b a^{m+n} \mid n \geq 1, n \in \mathbb{Z}, m \in \mathbb{Z} \}$$

Not sure how to do this problem

$$L = xyz$$

i)  $xy^i z \in L$  for each  $i > 0$

ii)  $|y| > 0$

iii)  $|xy| \leq p$

$$\begin{aligned}
 x &= a^j, \quad j \geq 0 \\
 y &= b a^k, \quad k \geq 1 \\
 z &= a^i b a^k b a^{m+n}
 \end{aligned}$$

$$\begin{aligned}
 xyz &= a^j b a^k + a^j b a^k b a^{m+n} \\
 &= a^{j+k} b a^k b a^{m+n}
 \end{aligned}$$



This does not equal  $L$ ,  $a^n b a^m b a^{m+n}$   
 $L$  is not regular

Not sure how to  
do this problem

5.)

string	$\in Y$	$\notin Y$
1	✓	
1#1		✓
1#11		✓
11#1	✓	
1#11#1	✓	
1#11#111	✓	
111#1#11		✓
11##1		✓
111#	✓	
11##		✓

Prove  $Y$  is not regular

$$Y = \{w \mid w = x_1 \# x_2 \# \dots \# x_k, k \geq 0, \\ x_i \in \{1\}^*, x_i \neq x_j \\ \text{for } i \neq j\}$$

$$L = xyz$$

$$i) xyz \in A \text{ for each } i \geq 0$$

$$ii) |y| > 0$$

$$iii) |xy| \leq p$$

$$S = 11\#1 \in Y$$

$$x = 1$$

$$y = 1$$

$$z = \#1$$

$$xy'z = 1\#\#1$$

$$xy'z \notin Y$$

$Y$  is not regular