Midterm 1

Problem 1:

Problem 2:

① $(tU0i)1^*$
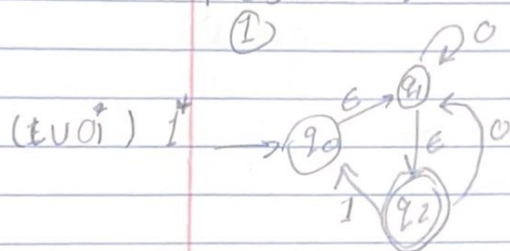
② remove q_1:

③ $q_0 \xrightarrow{\epsilon 0^*} q_2 \quad \supset \epsilon 0$
$\xleftarrow{1}$
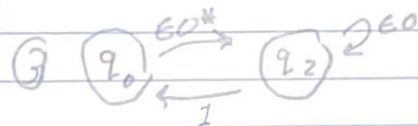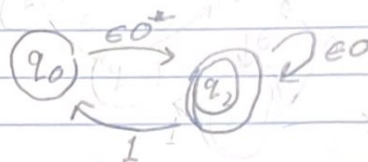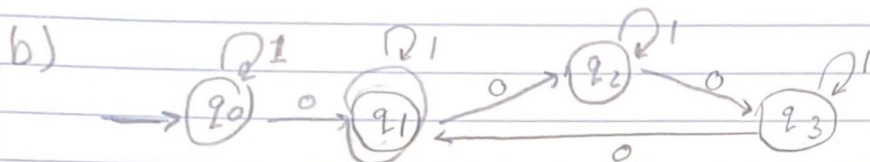
Final Expression: $(0+1)^*$

Problem 3:

a) 01, 101, 00001, 00100, 100001

b)

Problem 4:

1. It is regular
= regular expression: 00^*

2. It is NOT regular:

Pumping Lemma:

If it is a regular language, then there is a number $\underline{p}$ of length. $S = xyz$

1. for each $i \geq 0$, $xy^i z \in A$
2. $|y| > 0$
3. $|xy| \leq P$, for pumping lemma let $x = 00$
                     $y = 1$, $z = 1$, $P = 2$

So, Case 1: $L = xy^i z > 0$, if $i = 2 \Rightarrow L = \underline{0011}$ ✗
     Case 2: $|y| > 0$, $\Rightarrow 1 > 0$ ✓
     Case 3: $|xy| \leq P \Rightarrow 4 \leq 2$ ✗

This means it does not belong to L because it does not satisfy all 3 conditions