Allowed Time: 90 minutes

Problem 1: (2,8)
   a. Give at least 6 strings in ascending order of string length of the following language:
   b. Design a DFA of the following language:

$$L = \{w \in \{0,1\}^* \mid w \text{ is divisible by 2 and 3 }\}$$
Example: 110, 1100 are divisible by 2 and 3

Problem 2: (5+5)
Design an NFA of the following language with at most 4 states.

a. Design NFA without NULL transition of the following language with at most 4 states:

$$a(bab + ba)^*$$

b. Design an NFA of the following language with at most 4 states.

$$L = \{w \in \{a, b\}^* \mid w \text{ contains substring } aba \text{ or } aa\}$$

Problem 3: (10)
Covert the following NFA into DFA.

	$\delta(q,0)$	$\delta(q,1)$
Q1	{Q1,Q3}	{Q1,Q2}
Q2	{Q2,Q4}	{Q4}
Q3	{Q4}	{Q3,Q4}
Q4	Φ	Φ

Problem 4: (4,6)

	$\delta(q,a)$	$\delta(q,b)$	$\delta(q,\epsilon)$
Q0	{Q1}	{Q2}	{Q1}
Q1	Φ	{Q1,Q3}	Φ
Q2	Φ	Φ	{Q3}
Q3	{Q3}	{Q2}	Φ

Consider the above Finite Automata answer the following. Start State Q1 and Final State Q3.
   a) Compute ε-Closure (NULL CLOSURE) of all states
   b) Draw tree of string baab.

Problem 5: (5 + 5)

a. Give the Regular Expression of the language with set of strings that either begin or end (or both) with 01.

b. Give a Regular Expression of the language which contains substrings either aa or aba or both but ends at b.