Assignment #1 Part 3

(Course: CS 301, 2 Problems Total points: 35)

For regular students, the deadline is October 1, 2024, in class. For special needs students, the deadline is October 8, 2024, in class. No late assignments will normally be accepted.

Special note: Any answer that is not sufficiently clear even after a reasonably careful reading will not be considered a correct answer, and only what is written in the answer will be used to verify accuracy. No hand waiving, vague descriptions or sufficiently ambiguous statements that can be interpreted in multiple ways will be considered as a correct answer, nor will the student be allowed to add any explanations to his/her answer after it has been submitted.

Problem 1 (15 points): Give a *non-deterministic finite automata* (NFA) that accepts the following language L over the alphabet $\Sigma = \{0, 1\}$:

$L = \{w \in \Sigma^* \mid$ some two 0's in w are separated by a string of length $4j$, for some $j \geq 1\}$

For example:

- The NFA accepts 101**0**1100**0**011, and 111**0**11101010**0**101.
- The NFA does not accept ε, 0011 and 0011011.

Provide a brief explanation as to why your NFA is correct.

Problem 3 (20 points):

Using the method discussed in class, construct the DFA corresponding to the followingNFA M:

M = $(\{p, q, r, s\}, \{0, 1\}, \delta, p, \{q, s\})$, where δ is given by:

Q **Σ** $\mathbf{q_0}$ **F**

	0	1
p	q, s	q
q	r	q, r
r	s	p
s	—	p

Show all relevant steps.