The “Problems to be turned in” are to be done in groups of 3 (or 2 if necessary), each group should turn in one set of solutions with each group member’s name and e-mail account clearly indicated at the top. Students are to select their own groups and review the homework policies on the course information sheet.

Note: There will also be an individual Gradiance homework due on Monday the 18th.

3 Problems to be turned in, 10 pts

1. (3 pts) Exercise 2.5.2 on page 79 of the text. You may either convert the $\epsilon$-NFA to a DFA (using the algorithm in the text) or to an NFA (using the algorithm from class and described in the handout), but state which you are doing.

2. (3 pts) Give Regular Expressions for the following languages:
   - (1 pt) The Language $L$ consisting of all strings that contain 010 as a substring.
   - (2 pts) The Language $L$ consisting of all strings that do not contain 010 as a substring.

3. (4 pts) Exercise 2.33 on page 66 of the text (NFA to DFA construction).

Recommended self-practice exercises (not to be turned in):

1. Exercise 2.5.1

2. From the handout, for any $\epsilon$-NFA $E = (Q, \Sigma, \delta_E, q_0, F_E)$, the NFA $N = (Q, \Sigma, \delta_N, q_0, F_N)$ where $\delta_N(q,a) = \bigcup_{r \in \text{ECLOSE}(q)} \delta_E(r,a)$ and $F_N = \{ q : \text{ECLOSE}(q) \cap F_E \neq \emptyset \}$ accepts the same language. Show that adjusting $F_E$ to $F_N$ in this way is necessary, i.e., that there is an $\epsilon$-NFA $E$ where the NFA $N = (Q, \Sigma, \delta_N, q_0, F_E)$ accepts a different language than $L(F_E)$.

3. Convert the regular expression $(0 + 1)^*(0 + \epsilon)$ to an $\epsilon$-NFA using the process in section 3.2.3.