CS 4810 Homework Assignment 2 due Monday class Sept 10

1. Create a nondeterministic finite automaton to accept all strings of 0's and 1's that start and end in the same symbol.

2. Convert the nfa in Item 1 to a dfa.

3. Describe in English the set of strings $\{10^n10^n|n \geq 1\}^*$. List all strings in the set of length ten or less.

4. Let $S = \{10^n10^{n+1}|n \geq 1\}$. What is the set $10S^* \cap S^*10^*$?

5. Using $S_1 = \{10^n10^{n+1}|n \geq 1\}$ and $S_2 = \{10^n10^{2n}|n \geq 1\}$, write an expression for the set

$$S = \{1010^210^310^610^710^{14} \cdots 10^{2^{n+1}-1}|n \geq 1\} \cup \{1010^210^310^610^710^{14} \cdots 10^{2^{n+2}-2}|n \geq 1\}.$$

Each odd numbered block of 0's has one more 0 than the previous block and each even numbered block of 0's has twice as many 0's as the previous block. The last block has 3, 6, 7, 14, 15, 30, ..., number of 0's.