Weekly Proof Questions (Section 1.4)
Assigned: 1/29/2015
Due: 2/5/2015

1) Prove that $L = \{0^i1^j \mid j \neq i\}$ over the alphabet $\{0,1\}$ is not regular via the pumping lemma.

2) Using the result in class that if L_1 and L_2 are regular languages, then $L_1 \cap L_2$ is as well, prove the following assertion:

For languages L_1 and L_2, if $L_1 \cap L_2$ is NOT regular and L_1 is regular, then L_2 is not regular.

3) Utilizing the result proven in question #2, show that the following language, L, is not regular:

$L = \{ a^ib^jc^k \mid i \geq 0, j \geq 0, k \geq 0$, if $i = 1$, then $j = k$, otherwise, there are no restrictions of j, k$\}$

4) Attempt to prove that L from question 3 is not regular utilizing the pumping lemma. What problem do you run into?

5) Determine a DFA with the minimum number of states that is equivalent to the DFA described below:

DFA D: $Q = \{0, 1, 2, 3, 4, 5, 6\}$, $\Sigma = \{a, b\}$, $F = \{1,3,5,6\}$, 0 is the start state, and δ is described as follows:

Q	Σ	Q
0	a	1
0	b	3
1	a	2
1	b	4
2	a	5
2	b	5
3	a	4
3	b	2
4	a	5
4	b	5
5	a	6
5	b	5
6	a	6
6	b	6

Please use the algorithm shown in class.