CSE 2001: Introduction to the Theory of Computation
Tutorial 5, Oct 25, 2:30 pm

Problems:

1. Let $\Sigma = \{0, 1\}$. Show that the collection of all words in which the block 00 appears exactly once is regular.
2. Let $\Sigma = \{0, 1\}$. Show that the collection of all words not ending with 10 is regular.
3. If $L_1 \subseteq L_2$ and L_1 is not regular, then L_2 is not regular. True or false? Prove your answer.
4. If L_1 is regular, L_2 is nonregular, then $L_1 \cup L_2$ is not regular. True or false? Prove your answer.
5. Consider $\Sigma = \{a, b\}$. Let $L = \{a^m b^n | n, m \geq 0, m \leq n \leq 2m\}$. Is L regular?
6. Given a set of non-negative integers, the set of their expansions in base 10 forms a partial language of $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}^*$. Determine if the following languages are regular.
   - All numbers divisible by 10.
   - All numbers divisible by 3.
7. Show that $L = \{a^n b^m c^k | n, m, k \geq 0, n \neq m \text{ or } m \neq k \text{ or } k \neq n\}$ is not regular.
8. Is the following statement true or false: "all languages over a one character alphabet are regular"? Prove your answer.
9. Find an example of a non-regular language L such that L^* is regular.