CSCE 222 Homework 6 (Due Apr. 20)

1. What is the number of one-to-one functions $f$ from the set \{1, 2, \ldots, 2n\} to the set \{1, 2, \ldots, 2n\} so that either $2i - 1$ or $2i$ or both do not map to $2i - 1$ and $2i$ for all $1 \leq i \leq n$?

2. Let $R$ be the relation defined on the set of real numbers by $xRy$ whenever $xy \geq 0$. Show whether or not $R$ is reflexive, symmetric, antisymmetric or transitive.

3. Given a finite set $S$ with $n$ elements, let the relation $R = \{(S_1, S_2) \mid |S_1| = |S_2|, S_1, S_2 \subseteq S\}$. Prove that $R$ is an equivalence relation and determine the equivalence classes.

4. Construct a deterministic finite-state automaton for the language $L = \{w \in \{0, 1\}^* \mid w \text{ starts or ends with } 010\}$.

5. Give an informal description of a deterministic Turing machine for the language $L = \{w \in \{0, 1\}^* \mid w \text{ is not of the form } (01)^n(10)^n \text{ for } n \geq 0\}$.