Automata Theory: Assignment 1

Due date: September 2 (Thursday)

Problem 1 (4 points)
Consider the following sets of integer numbers:

$$S_1 = \{4, 5, 6\}$$
$$S_2 = \{i : \ i \text{ is even}\}$$
$$S_3 = \{i : \ i \text{ is divisible by } 3\}$$

For each set below, specify its elements and determine whether it is finite or infinite:

$$S_4 = S_1 \times S_1$$
$$S_5 = 2^{S_1}$$
$$S_6 = S_1 \cap S_2$$
$$S_7 = S_2 \cap S_3$$

Problem 2 (2 points)
Show that, if $S_1 \subseteq S_2$, then $\overline{S_2} \subseteq \overline{S_1}$.

Problem 3 (4 points)
(a) Draw an example of a graph that has six vertices and six edges. Mark all simple cycles in your graph.

(b) Draw an example of a tree that has seven vertices, five of which are leaves. How many edges are in your tree?