CSE 321: Discrete Structures
Assignment #1
March 29, 2000
Due: Wednesday, April 5

Reading Assignment: Rosen, pp. 76 – 78, Sections 2.3-2.5

Problems:

1. Section 1.3, exercise 6, parts b and c.
2. Section 1.3, exercise 10, parts b and d.
3. Section 1.3, exercise 12, parts f, i and j.
4. Give the negation of each of the following statements:
   - All good students study hard.
   - No males give birth to their young.
   - No students in mathematics are unable to use a computer.
   - $\forall x \exists y \; x = y^2$
5. Let $Q(A, B)$ be the statement $A \subseteq B$. If the universe of discourse for both A and B is all sets of integers, what are the truth values of the following? Justify your answers.
   - $(\forall A)(\exists B)Q(A, B)$
   - $(\forall B)(\exists A)Q(A, B)$
   - $(\exists A)(\forall B)Q(A, B)$
   - $(\forall A)(\forall B)Q(A, B)$
6. Which of the following statements are true?
   - $\{x\} \subseteq \{x\}$
   - $\{x\} \in \{x, \{x\}\}$
   - $\{x\} \in \{x\}$
   - $\{x, \{x\}\} \subseteq \mathcal{P}(\{x\})$
7. Carefully prove the following implications.

- $(A \cup B = B) \rightarrow (A \subseteq B)$
- $(A \cap B = A) \rightarrow (A \subseteq B)$

8. Section 1.6, Problem 12

9. Let $f : \mathcal{R} \rightarrow \mathcal{R}$, where $f(x) = x^3$ and $g : \mathcal{R} \rightarrow \mathcal{R}$, where $g(x) = x - 3$. Give expressions for $f \circ f$, $f \circ g$, $g \circ f$ and $g \circ g$.

10. **Extra Credit** Section 1.6, Problem 20.