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CMSC 203 - Discrete Structures - Fall 2002

Homework Assignment 1 - Due Thursday, September 26

1. Construct the truth table for the compound proposition: $[p \vee (\neg q \rightarrow \neg p)] \leftrightarrow (q \rightarrow \neg p)$

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2. What is the negation of the quantified statement: *Every boy has some girl who loves him.*

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3. Later in this course, we will study the Inclusion-Exclusion Rule:

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|.$$

Verify this for the sets $A = \{1,3,4,6,7,9\}$, $B = \{2,3,4,5,6\}$, and $C = \{1,3,5,7,9\}$.

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4. Find $A \times B$ for the sets $A = \{ \emptyset, \{0,1\} \}$ and $B = \{ \{0\}, \{1\} \}$

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5. Show that the function $f: \mathbf{R} \rightarrow \mathbf{R}$ given by $f(x) = 5x + 3$ is One-To-One and Onto.

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6. Let the function $f: \mathbf{R} \rightarrow \mathbf{R}$ be $f(x) = 5x + 3$ and the function $g: \mathbf{R} \rightarrow \mathbf{R}$ be $g(x) = x^2 + 1$. Find:

(a) $f(g(x))$

(b) $g(f(x))$