CS381 Introduction to Discrete Structures

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– Assignment 2 –

Due: March 3, 2010, no later than 3:00pm

Objective: The main goal of your second assignment is for you to practice reasoning about sets and their various properties. In dealing with sets, you will find it useful to apply knowledge that you have acquired studying propositional and predicate logic as well as predicate calculus. As discussed before, please make sure you understand that the assignment is strictly personal and giving/receiving undue help is a violation of the Honor Code of Old Dominion University and will be dealt with accordingly. If you are not sure what constitutes a violation of the Honor Code please do not hesitate to ask.

Statement of your assignment:

Problem 1. [20%] Let $A$ and $B$ be sets. Prove that

$$A - B \subseteq A.$$ 

Problem 2. [10%] Consider the sets $A = \{0, 2, 4, 6, 8, 10\}$, $B = \{0, 1, 2, 3, 4, 5, 6\}$ and $C = \{4, 5, 6, 7, 8, 9, 10\}$. List the elements that belong to the set

$$(A - B) \cup (A - B) \cup (A - C).$$

Problem 3. [20%] The symmetric difference $A \oplus B$ of sets $A$ and $B$ is defined as

$$A \oplus B = (A - B) \cup (B - A).$$

Show that

$$A \oplus B = B \oplus A.$$ 

Problem 4. [20%] Show that if $A$ and $B$ are sets then

$$A \oplus B = (A \cup B) - (A \cap B).$$

Problem 5. [20%] Let $A$, $B$ and $C$ be sets such that $A \cup C = B \cup C$ and $A \cap C = B \cap C$. Can you conclude that $A = B$?

Problem 6. [10%] Consider the sets $A = \{0, 2, 4, 6, 8, 10\}$, $B = \{0, 1, 2, 3, 4, 5, 6\}$ and $C = \{4, 5, 6, 7, 8, 9, 10\}$. List the elements that belong to the set

$$(A - B) \cup (B - A).$$