CSCE 235 **Fall 2000**

Homework #1

Question 1: Prove or disprove: For any sets A, B, C, and D:

Note: F^c is the same as $\overline{F}$ and $F \setminus G$ is the same as $F - G$, for any sets F and G. Also, $\Longleftrightarrow$ is the same as $\longleftrightarrow$ and $\Longrightarrow$ is the same as $\longrightarrow$.

(a) $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$

(b) $A \cup B = A \cup C$ and $A \cap B = A \cap C \Longrightarrow B = C$.

(c) $(A \cap B) \cup C = A \cap (B \cup C) \Longleftrightarrow C \subset A$.

(d) $A \cap B^c = \phi$ and $A^c \cap B = \phi \Longleftrightarrow A = B$.

(e) $A \cup B = A \cap B \Longleftrightarrow A = B$.

(f) $(A^c \cap (A \cup B)) \cup (A \cap B) = B$.

(g) $(A \cap B)^c = A^c \cap B^c$.

(f) $(A \cup B) \times C = (A \times C) \cup (B \times C)$.

(g) $(A \cup B) \setminus C = (A \setminus C) \cup (B \setminus C)$.

(h) $(A^c \cap (A \cup B)) \cup (A \cap B) = B$.

Question 3: Let x be any integer. Determine whether the following statement is true or false. Give full explanation.

"If 5 is a solution of $e^{x-5} = 3$ or if $2x$ is an even integer, then $2x + 1$ is an odd integer and 4 is an even integer."

Question 4: Let $A = \{1\}$ and $B = \{1, 2\}$ be subsets of the universal set $X = \{1, 2, 3\}$. Find

(a) $A \setminus B$ (b) $A \cap B$ (c) $A \cup B$.

(d) $A \oplus B$ (e) $A \times B$ (f) A^c.