

# Math 3210-3

## HW 3

Due Friday, August 31, 2007

There are 7 points possible on this assignment. Only part (b) of problem 3 will be graded.

### Set Operations

1. Prove:  $(A \setminus B) \cup (B \setminus A) = (A \cup B) \setminus (A \cap B)$ .
2. ♣ Prove:  $A \cap B = A \setminus (A \setminus B)$ .
3. Let  $\{A_j : j \in J\}$  be an indexed family of sets and let  $B$  be a set. Prove the following generalizations of theorem 6 from class.
  - (a)  $B \cup \left[ \bigcap_{j \in J} A_j \right] = \bigcap_{j \in J} (B \cup A_j)$ .
  - (b)  $B \cap \left[ \bigcup_{j \in J} A_j \right] = \bigcup_{j \in J} (B \cap A_j)$ .
  - (c)  $B \setminus \left[ \bigcup_{j \in J} A_j \right] = \bigcap_{j \in J} (B \setminus A_j)$ .
  - (d)  $B \setminus \left[ \bigcap_{j \in J} A_j \right] = \bigcup_{j \in J} (B \setminus A_j)$ .

### Relations

4. ♣ Prove or give a counterexample:  $A \times B = B \times A$ .
5. Prove or give a counterexample:
  - (a)  $(A \cup B) \times C = (A \times C) \cup (B \times C)$ .
  - (b)  $(A \times B) \cap (C \times D) = (A \cap C) \times (B \cap D)$ .
  - (c) ♣  $(A \times B) \cup (C \times D) = (A \cup C) \times (B \cup D)$ .