

**Examlet 2      Foundations of Advanced Math      2/26/10**

1. a) Let  $A = \{1,2,3\}$  and  $B = \{2,3,4\}$ . What is  $A \cup B$ ?

b) Let  $A = \{1,2,3\}$  and  $B = \{2,3,4\}$ . What is  $A \cap B$ ?

c) Let  $C = [3, 5]$  and  $D = [4, 8]$ . What is  $C - D$ ?

d) Let  $E = \{1,2\}$  and  $F = \{5, 7\}$ . What is  $E \times F$ ?

2. a) Let  $\mathbb{N}^+ = \mathbb{N} - \{0\}$ . Let  $A_n = (0, n)$  for each  $n \in \mathbb{N}^+$ . What is  $\bigcup_{n \in \mathbb{N}^+} A_n$ ?

b) Let  $I$  be a set such that for each  $i \in I$ ,  $A_i$  is itself a set. Then  $\left( \bigcup_{i \in I} A_i \right)' = \bigcap_{i \in I} A_i'$ .

3. a)  $\forall x, y \in \mathbb{R}$ , If  $|x| \leq y$ , then  $-y \leq x \leq y$ .

b)  $\forall x, y \in \mathbb{R}$ , If  $-y \leq x \leq y$ , then  $|x| \leq y$ .

4. Let  $A$ ,  $B$ , and  $C$  be sets. If  $A \subseteq B$ , then  $A - C \subseteq B - C$ .

5. a)  $\forall a, b, c, d \in \mathbb{R}$ , if  $a > b$  and  $c > d$ , then  $a + c > b + d$ .

b)  $\forall a, b, c, d \in \mathbb{R}$ , if  $a > b$  and  $c > d$ , then  $a \cdot c > b \cdot d$ .

