Examlet 2b Foundations of Advanced Math 3/1/13

1. For any sets A, B, and C, $A \cup (B \cap C) \subseteq A \cup B$.

2. Suppose that $a, b, c \in \mathbb{R}$. If $c < 0$ and $a < b$, then $a \cdot c > b \cdot c$.

3. Let $\mathbb{R}^+ = \{x \mid x \in \mathbb{R} \text{ and } x > 0\}$. For each $x \in \mathbb{R}^+$, let $A_x = (0, x]$.

a) What is $\bigcap_{x \in \{1,2,3\}} A_x$?

b) What is $\bigcup_{x \in \{1,2,3\}} A_x$?

c) What is $\bigcap_{x \in \mathbb{R}^+} A_x$?

d) What is $\bigcup_{x \in \mathbb{R}^+} A_x$?

4. Suppose I is a set and for each $i \in I$, A_i and B_i are sets, and that there is some $i \in I$ for which $A_i \subseteq B_i$.

   a) Is it true that $\bigcup_{i \in I} A_i \subseteq \bigcup_{i \in I} B_i$? Support your answer.

   b) Is it true that $\bigcap_{i \in I} A_i \subseteq \bigcap_{i \in I} B_i$? Support your answer.

5. $\forall\, x \in \mathbb{R},\ -|x| \le x \le |x|$.