Examlet 2b Foundations of Advanced Math 2/27/09

1. a) Find $\{0,1,3,4\} \cap \{0,2,4\}$

b) Find $\{0,1,3,4\} \cup \{0,2,4\}$

c) Find $[3,5] - [4, \infty)$

d) State the definition of the Cartesian product of two sets A and B.

e) Find $\{1, 2, 3\} \times \{a, b\}$.

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2. a) For any $a, b \in \mathbb{R}$, $|a - b| \leq |a + b|$.

b) For any $a \in \mathbb{R}$, $|a| \geq a$.

3. Let $A \subseteq B$. Show that $A \cup C \subseteq B \cup C$.

4. Let $\{ A_i \mid i \in I \}$ be an indexed family of sets, and let B be a set. Show that .

$$\left(\bigcup_{i \in I} A_i \right)' = \bigcap_{i \in I} A_i'$$

5. a) Suppose that $r \in \mathbb{R}$, with $r > 1$. Show that $r^2 > 1$.

b) Suppose that $r \in \mathbb{R}$, with $r > 1$. Show that for all $n \in \mathbb{N}$, $r^n > 1$.