Math 215. Homework 5

due 02/18/08

1. Prove that for sets A,B,C and D

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

2. Let $f(x) = x^2, g(x) = x - 1$ be functions $\mathbf{R} \to \mathbf{R}$.
Find functions $f \circ f, f \circ g, g \circ f, g \circ g$.

3. For $A \in \mathcal{P}(X)$ let $\chi_A(x)$ be the characterstic function of A on X defined as following: if $x \in A$ then $\chi_A(x) = 1$ and $\chi_A(x) = 0$ otherwise. Express $\chi_{A \cup B}$ in terms of $\chi_A \cdot \chi_B, \chi_{A \cap B}$

4. Show that $lim_{n \to \infty} \frac{1}{n^2} = 0$

5. Calculate $lim_{n \to \infty} \frac{n}{n+1}$ and prove your answer using definition of limit.