CSCE 222 Homework 1 (Due Jan. 31)

1. Find a simplest proposition that is logically equivalent to $\neg(p \vee \neg(p \leftrightarrow q))$.
2. Prove whether one of the propositions $p \rightarrow (q \rightarrow r)$ and $(p \rightarrow q) \rightarrow r$ logically implies the other or not.
3. Determine whether one of $\neg\forall x P(x)$, $\neg\forall x \neg P(x)$ must be true when the domain is not empty.
4. Given sets A and B, prove that if $A \subseteq B$, then $(A \cap B) \times B \subseteq A \times (A \cup B)$.
5. Is it possible that $P(A) = B \times C$ for some sets A, B and C, where $P(A)$ is the power set of A and the ordered pair (a, b) is defined to be $\{a, \{a, b\}\}$?