Practice Final Exam MATH 300A, Autumn 2010

(1) Use induction to prove that $2^n > n^3$ for all $n \geq 10$.

(2) Let R and S be relations on a set A. Prove the following statement, or give a counterexample. If R and S are both transitive then so is $R \cup S$.

(3) Let U be a set. Prove that there is a unique $A \in \mathcal{P}(U)$ such that for every $B \in \mathcal{P}(U)$, $A \cup B = A$.

(4) Suppose A, B and C are sets. Prove that $(A \cup B) \triangle C \subseteq (A \triangle C) \cup (B \triangle C)$.

(5) Prove that if x and y are odd integers, then xy is odd.

(6) Let $\mathcal{F}$ be a family of sets. If $A \in \mathcal{F}$, prove that $\cap\mathcal{F} \subseteq A$.

(7) Let x be a real number. Show that $|2x - 6| > x$ if and only if $|x - 4| > 2$.