HW DUE MONDAY 9/20

MATH 309, SECTION 3

(1) (a) For U, V, W sets, show $U \subset V \Rightarrow (U \cup W) \subset (V \cup W)$.
    (b) Show the converse is not true, i.e. $U \subset V \not\Leftarrow (U \cup W) \subset (V \cup W)$. (*Give a counter-example.*)
(2) 1.2:8ace. Prove or disprove the following subsets of $\mathbb{R}$ are closed under ordinary multiplication: $[5, \infty)$, $(-1, 0)$, and $\{1, 2, 4, 8, 16, \ldots\}$. (*See p.11 Quick Example for examples.*)
(3) (a) Finish proving that $\mathbb{P}_2$, polynomials of degree less than or equal to 2, is a vector space by verifying the remaining axioms. (*See p.22-23 for the example of verifying axioms for* $\mathbb{R}^2$.)
    (b) There is an obvious way to multiply polynomials. Is $\mathbb{P}_2$ closed under multiplication? What about $\mathbb{P}$, the set of all polynomials? (*You don't need to do a formal proof for this problem, just explain your answers.*)