Math 225, Errata to Solutions to Practice Questions for Exam #1, February 24, 2010

**Problem 5a** The limit exists! For all $-1 < y < 1$, observe that $y^8 \leq y^2$. Therefore, for all $-1 < y < 1$, we have

$$x^2 \leq (x^2 + y^8) \leq (x^2 + y^2)$$

and therefore,

$$0 \leq \frac{x^2}{x^2 + y^2} \leq 1,$$

or,

$$0 \leq \left| \frac{x^3 y^3}{x^2 + y^2} \right| \leq |xy^3|$$

so applying the Squeeze Theorem

$$0 \leq \lim_{(x, y) \to (0, 0)} \left| \frac{x^3 y^3}{x^2 + y^2} \right| \leq \lim_{(x, y) \to (0, 0)} |xy^3| = 0$$

where the last equality holds since $xy^3$ is a polynomial and is, hence, continuous. Therefore,

$$\lim_{(x, y) \to (0, 0)} \frac{x^3 y^3}{x^2 + y^2} = 0.$$

**Problem 7d** The answer should be $+|\vec{u} \times \vec{w}| = \frac{15}{\sqrt{2}}$ since $\vec{n}$ and $\vec{u} \times \vec{w}$ point in the same direction.