Quiz 3 September 18, 2007 Math 215

1. Find $\lim_{x \to 3} \frac{x^2-9}{x-3}$.

$$= \lim_{x \to 3} \frac{\cancel{(x-3)}(x+3)}{\cancel{x-3}} = \lim_{x \to 3} (x+3) = \boxed{6}$$

2. Find $\lim_{x \to 2^-} \sqrt[3]{\frac{8-x^3}{x^2-4}}$.

$$= \lim_{x \to 2^-} \sqrt[3]{\frac{(2-x)(4+2x+x^2)}{(x-2)(x+2)}} = \lim_{x \to 2^-} \sqrt[3]{\frac{(-1)(x^2+2x+4)}{x+2}}$$

$$= \sqrt[3]{\frac{-(4+4+4)}{4}} = \boxed{-\sqrt[3]{3}}$$

3. Find a so that $f(x)$ is continuous for all x, where

$$f(x) = \begin{cases} x^2 + 3ax + 2, & x \le 2 \\ x^3 + a, & x > 2. \end{cases}$$

$$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^-} (x^2 + 3ax + 2) = 4 + 6a + 2 = 6 + 6a$$

$$\lim_{x \to 2^+} f(x) = \lim_{x \to 2^+} (x^3 + a) = 8 + a$$

Also, $f(2) = 6 + 6a$. So must have $6 + 6a = 8 + a$

$5a = 2$ $\boxed{a = 2/5}$

4. What is $\lim_{x \to \infty} \frac{3x^3 + x^4 - 8x^2 + 10000}{1 + x^4}$.

$$= \lim_{x \to \infty} \frac{x^4}{x^4} = \boxed{1}$$

(As $x \to \infty$, all other terms (besides the x^4's) become negligible.)