Prof. Haiman

Quiz 2 Solution (Version A)

In each of the following, (1) decide whether the limit exists as a number, as an infinite limit, or not at all, and (2) evaluate the limit if it exists.

(a)
$$\lim_{x \to 3} \frac{\frac{1}{3} - \frac{1}{x}}{x - 3}$$

(b)
$$\lim_{x \to 0} \frac{|x|}{x^2}$$

(c)
$$\lim_{x \to 0} \frac{|x|}{x^3}$$

(a) For $x \neq 3$, $(1/3 - 1/x)/(x - 3) = 1/(3x)$. Substituting $x = 3$ gives $\lim_{x \to 3} \frac{\frac{1}{3} - \frac{1}{x}}{x-3} = 1/9$.

(b) $|x|/x^2 = |1/x|$, so $\lim_{x \to 0} \frac{|x|}{x^2} = +\infty$.

(c) $|x|/x^3$ approaches $+\infty$ as $x \to 0^+$ and approaches $-\infty$ as $x \to 0^-$, so the limit doesn't exist, either as a number or as an infinite limit.