Limits

1. Suppose $\lim_{x\to a} f(x) = L$ and $\lim_{x\to a} g(x) = M$. State whether the following are true or false:

(a) $\lim_{x\to a}[f(x) + g(x)] = L + M$.

(b) $\lim_{x\to a}[f(x) \cdot g(x)] = L \cdot M$.

(c) $\lim_{x\to a}[f(x)/g(x)] = L/M$.

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2. Compute each of the following limits:

(a) $\lim\limits_{x\to 0} \dfrac{x^2 - x}{x}$ (b) $\lim\limits_{x\to 3} \dfrac{x^2 - 7x + 12}{x - 3}$ (c) $\lim\limits_{x\to 9} \dfrac{x - 9}{3 - \sqrt{x}}$

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3. Evaluate $\lim_{x\to 4^+} \sqrt{x-4}$. What's the deal with $\lim_{x\to 4^-} \sqrt{x-4}$?

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4. Let $f(x) = \tan(x)$. Remember in calculus we use radians, not degrees.

(a) Graph $f(x)$ on the interval $[-4\pi, 4\pi]$.

(b) What is $\lim_{x\to\pi} f(x)$?

(c) Compute $\lim_{x\to\pi} \sin(x)$ and $\lim_{x\to\pi} \cos(x)$ and use this to check your answer to (b).

(d) What is $\lim_{x\to\pi/2} f(x)$?

(e) Compute $\lim_{x\to\pi/2} \sin(x)$ and $\lim_{x\to\pi/2} \cos(x)$ and use this to explain what happened in (d).