Elements of Calculus I, MATH 180 Quiz 1

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Determine the following limits:

(1) $\lim_{x\to -3} 2x+4.$ $= 2(-3)+4 = -2$

(2) $\lim_{x\to -2} \dfrac{x^2+7x+10}{x^2-4}.$ $= \lim_{x\to -2} \dfrac{(x+2)(x+5)}{(x+2)(x-2)} = \lim_{x\to -2} \dfrac{x+5}{x-2} = -\dfrac{3}{4}$

(3) $\lim_{x\to 1} \dfrac{2}{x-1}.$ DNE since the function has very large + & − values near 1.

(4) Suppose $f(x) = \begin{cases} 3-x^2 \text{ if } x<0 \\ 2x \text{ if } x \geq 0 \end{cases}$.

(a) $\lim_{x\to 0^-} f(x).$ $= \lim_{x\to 0^-} 3-x^2 = 3-0=3$

(b) $\lim_{x\to 0^+} f(x).$ $= \lim_{x\to 0^+} 2x = 2\cdot 0 = 0$

(5) $\lim_{x\to\infty} \dfrac{1-4x^2}{5x^2+9}.$ $= \lim_{x\to\infty} \dfrac{(1-4x^2)\frac{1}{x^2}}{(5x^2+9)\frac{1}{x^2}} = \lim_{x\to\infty} \dfrac{\frac{1}{x^2}-4}{5+\frac{9}{x^2}} = -\dfrac{4}{5}$ ($\frac{1}{x^2}\to 0$, $\frac{9}{x^2}\to 0$)