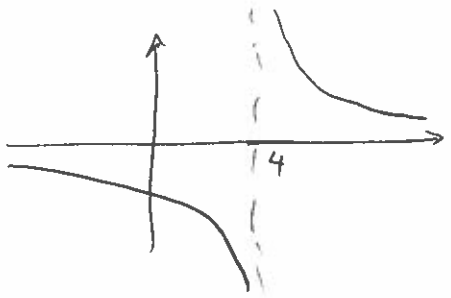
MAT 175 Solutions to HW3

1a) $\lim_{x\to 4^-} \frac{9x^2}{x-4} = -\infty$ ($9x^2 \to 9\cdot 16 = 144$, $x-4 \to 0^-$)




1b) $\lim_{x\to 1} \frac{x^2+2x+3}{x-1}$ ($x^2+2x+3 \to 6$, $x-1 \to 0$)

Does not exist, function has a vertical asymptote at $x=1$ and the lateral limits do not match:

$$\lim_{x\to 1^-} \frac{x^2+2x+3}{x-1} = -\infty, \quad \lim_{x\to 1^+} \frac{x^2+2x+3}{x-1} = +\infty.$$

1c) $$\lim_{x\to+\infty} \frac{x^2+2x-8}{4x-3} = \lim_{x\to\infty} \frac{x^2\left(1+\left(\frac{2}{x}\right)^{\to 0}-\left(\frac{8}{x^2}\right)^{\to 0}\right)^{\to 1}}{x\left(4-\left(\frac{3}{x}\right)^{\to 0}\right)^{\to 4}} = +\infty$$

1d) $$\lim_{x\to+\infty} \frac{7x^3+3x^2-9x+1}{14x^3-5x^2-7} = \lim_{x\to+\infty} \frac{x^3\left(7+\left(\frac{3}{x}\right)^{\to 0}-\left(\frac{9}{x^3}\right)^{\to 0}+\left(\frac{1}{x^3}\right)^{\to 0}\right)^{\to 7}}{x^3\left(14-\left(\frac{5}{x}\right)^{\to 0}-\left(\frac{7}{x^3}\right)^{\to 0}\right)^{\to 14}} = \frac{7}{14} = \frac{1}{2}$$