

3) $\lim_{x \rightarrow 5}$ $\frac{4x^2 - 7x + 5}{5 - 3x}$

a) $\lim_{x \rightarrow 0} (9x^2 - 7x + 5)$ } B) $\lim_{x \rightarrow 3} \frac{x^2 + 2x - 3}{5 - 3x}$

$$9 \cdot (1)^2 - 7 \cdot (1) + 5$$
$$9 - 7 + 5$$

$$\textcircled{A} = 7$$

$$\frac{(-3)^2 + 2(-3) - 3}{5 - 3(-3)}$$

$$\frac{9 + 6 - 3}{5 + 9}$$

$$\frac{9 - 9}{4} = \frac{0}{4}$$
$$\textcircled{B} = 0$$

c) $\lim_{x \rightarrow 2} \left(\frac{3x^2 - 2x - 5}{-x^2 + 3x + 4} \right)$

$$\left(\frac{3(2)^2 - 2(2) - 5}{-(2)^2 + 3 \cdot (2) + 4} \right)^3$$

$$\left(\frac{1}{2} \right)^3$$

$$\textcircled{C} = \frac{1}{8}$$

$$\left(\frac{12 - 4 - 5}{-4 + 6 + 4} \right)^3$$

$$\left(\frac{12 - 9}{4 - 10} \right)^3$$

$$\left(\frac{3}{6} \right)^3$$

$$d) \lim_{x \rightarrow -1} \sqrt{\frac{2x^2 + 3x - 3}{6x - 4}}$$

$$\sqrt{\frac{(2(-1)^2 + 3(-1) - 3)}{5(-1) - 4}}$$

$$\sqrt{\frac{2 - 6}{-5}} = \sqrt{\frac{-4}{-5}}$$

$$\sqrt{\frac{-4}{-5}}$$

$$\sqrt{\frac{4}{5}} \quad \textcircled{1}$$

$$\frac{\sqrt{4}}{\sqrt{5}} = \frac{2}{\sqrt{5}}$$

$$81) \lim_{x \rightarrow 2} \frac{\sqrt{2x^2 + 3x + 2}}{6 - 4x}$$

$$\frac{\sqrt{2(2)^2 + 3 \cdot 2 + 2}}{6 - 4 \cdot 2}$$

$$\frac{\sqrt{8 + 6 + 2}}{6 - 8} = \frac{\sqrt{16}}{-2} = \frac{4}{-2} = \textcircled{-2}$$

2) calcule os limites abaixo

$$a) \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$$

$$\frac{(x+1) \cdot (x-1)}{x-1} = (x+1)(1+1) = \textcircled{2}$$

$$e) \lim_{x \rightarrow 2} \frac{\sqrt[3]{3x^3 - 5x^2 - x + 3}}{4x + 3}$$

$$\sqrt[3]{\frac{3(-2)^3 - 5(-2)^2 - (-2) + 3}{4(-2) + 3}}$$

$$\sqrt[3]{\frac{3 \cdot -8 - 5 \cdot 4 + 2 + 3}{-8 + 3}}$$

$$\sqrt[3]{\frac{-24 - 20 + 5}{-5}}$$

$$\sqrt[3]{\frac{-35}{-5}}$$

$$k = \sqrt[3]{\frac{35}{5}}$$

$$b) \lim_{x \rightarrow 2} \frac{4-x^2}{2+x}$$

$$\frac{(2-x)(2+x)}{(2+x)} \rightarrow (2-x) = (2-(2)) = 0$$

$$c) \lim_{x \rightarrow 0} \frac{2x^2+5x-3}{2x^2-5x+2}$$

$$2x^2+5x-3=0$$

$$-5 \pm \sqrt{25+24} \\ 4$$

$$\frac{-5 \pm 7}{4} = \begin{cases} \frac{2}{4} = \frac{1}{2} \\ \frac{-12}{4} = -3 \end{cases} \quad \left. \begin{array}{l} 2x^2+5x+2=0 \\ 5 \pm \sqrt{25-48} \\ 4 \\ \frac{5 \pm 3}{4} \end{array} \right\} \begin{array}{l} 3 \\ -2 \\ \frac{3}{4} = 0.75 \\ \frac{2}{4} = \frac{1}{2} \end{array}$$

$$\lim_{x \rightarrow 0} \frac{(x+3)\left(\frac{x-1}{2}\right)}{(x+2)\left(\frac{x-1}{2}\right)}$$

$$\frac{\frac{1}{2}+3}{2+2} = \frac{\frac{7}{2}}{\frac{3}{2}} = \frac{7}{3} = 3$$

$$d) \lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1} = 0$$

$$\lim_{x \rightarrow 1} \left(\frac{x^2 + x + 1}{x + 1} \right)$$

$$\frac{1^2 + 1 + 1}{1 + 1} = \frac{3}{2}$$

$$\lim_{x \rightarrow 0} \frac{(x-1) - (x^2 - x + 1)}{(x-1) \times (x+1)}$$

8) $\lim_{x \rightarrow 0} \frac{8x + x^3}{9x + x^2} = 0$

$$\lim_{x \rightarrow -2} \left(\frac{(2+x) \cdot (4-2x+x^2)}{(2-x) \cdot (2+x)} \right)$$

$$\lim_{x \rightarrow -2} \left(\frac{x^2 - 2x + 4}{2-x} \right)$$

$$\lim_{x \rightarrow 2} \frac{(-2)^2 - 2 \cdot (-2) + 4}{2 - (-2)} = 3$$

8) $\lim_{x \rightarrow 1} \frac{x^3 - 3x^2 + 6x - 4}{x^3 - 4x^2 + 8x - 5} = 0$

$$\lim_{x \rightarrow 1} \left(\frac{x^3 - x^2 - 2x^2 + 2x + 4x - 4}{x^3 - x^2 - 3x^2 + 3x + 5x - 5} \right)$$

$$\lim_{x \rightarrow 1} \left(\frac{x^2 - 2x + 4}{x^2 - 3x + 5} \right)$$

$$\frac{1^2 - 2 \cdot 1 + 4}{1^2 - 3 \cdot 1 + 5} = \frac{1}{-1} = -1$$

$$3) a) \lim_{x \rightarrow 2} \frac{3x-4}{(x-2)^2}$$

$$\lim_{x \rightarrow 2} \left(\frac{3x-4}{(x-2)^2} \right) = +\infty$$

$$\lim_{x \rightarrow 2} \left(\frac{3x-4}{(x+2)^2} \right) = +\infty$$

$$b) \lim_{x \rightarrow 1} \frac{2x+3}{(x-1)^2} \cdot \frac{2(1)+3}{(1-1)^2} = \frac{3+3}{0} \cdot \frac{5}{0} = +\infty$$

$$c) \lim_{x \rightarrow 1} \frac{1-3x}{(x-1)^2} = \frac{1-3 \cdot 1}{(1-1)^2} = \frac{-2}{0^2} = -\infty$$

$$d) \lim_{x \rightarrow 0} \frac{3x^2 - 5x + 2}{x^2} = \frac{3(0)^2 - 5(0) + 2}{0^2} = +2 = +\infty$$

$$4) a) \lim_{x \rightarrow 100} (2x+3) \quad a > 0 \Rightarrow n=2 \quad m=1 \Rightarrow +\infty$$

$$b) (4-5x) \quad a < 0 = 0 - 5 \quad m=1 \Rightarrow +\infty$$

$$x \rightarrow 0 \quad 5x^2 - 4x + 3 = a > 0 \quad m=2 \Rightarrow +\infty$$

$$d) \lim_{x \rightarrow -\infty} (4-x^2)$$
$$a < 0 \Rightarrow n = -1, m = -2 \Rightarrow -\infty$$

$$e) \lim_{x \rightarrow -\infty} (3x^3 - 4) \quad a > 0 \Rightarrow a = 3, n = 3 \Rightarrow -\infty$$

$$5) a) \lim_{x \rightarrow \infty} (3x^2 - 5x + 2) \quad a > 0 \Rightarrow a = 3, n = 2 = \infty$$

$$b) \lim_{x \rightarrow \infty} \left(\frac{-4x^3 + 7x}{2x^2 - 3x + 10} \right) = \lim_{x \rightarrow \infty} (-4x^3 + 7x) = +\infty$$
$$\lim_{x \rightarrow -\infty} (2x^2 - 3x + 10) = +\infty$$

$$c) \lim_{x \rightarrow -\infty} \left(\frac{11x+2}{2x^2-1} \right)$$

$$\lim_{x \rightarrow -\infty} (11x+2) \not\rightarrow -\infty$$
$$\lim_{x \rightarrow -\infty} (2x^2 - 1) \rightarrow +\infty$$

$$\lim_{x \rightarrow -\infty} \left(\frac{\frac{11}{x^2} + \frac{2}{x^3}}{2 - \frac{1}{x^3}} \right)$$

$$\frac{11 \cdot 0 + 2 \cdot 0}{2 - 0} = 0$$

$$d) \lim_{x \rightarrow 0 \pm \infty} \left(\frac{x^3 + 3x + 1}{2x^2 + x + 1} \right)$$

lim

$$x \rightarrow 0 \pm \infty (x^3 + 3x + 1) \rightarrow +\infty$$

lim

$$x \rightarrow 0 \pm \infty (2x^2 + x + 1) \rightarrow +\infty$$

lim

$$x \rightarrow 0 \pm \infty \left(\frac{\frac{x+3}{x} - \frac{1}{x^2}}{\frac{2+\frac{1}{x} + \frac{1}{x^2}}{x \cdot x^2}} \right) \rightarrow +\infty$$

$$d = \infty$$

$$e) \lim_{x \rightarrow 0 \pm \infty} \left(\frac{2x+3}{5x+7} \right) \quad f) \lim_{x \rightarrow \infty} \left(\frac{1-2x^3}{4x^2+12} \right)$$

$$\lim_{x \rightarrow 0 \pm \infty} (2x+3) = +\infty$$

lim

$$x \rightarrow 0 \pm \infty (1-12x^3) = -\infty$$

$$g) \lim_{x \rightarrow 0 \pm \infty} (5x+7) = +\infty$$

lim

$$x \rightarrow 0 \pm \infty (4x^2 + 12) = \infty$$

$$\lim_{x \rightarrow 0 \pm \infty} \left(\frac{2+\frac{3}{x}}{5+\frac{7}{x}} \right)$$

$$\lim_{x \rightarrow 0 \pm \infty} \left(\frac{\frac{1}{x^2} - 12x}{4 + \frac{12}{x^2}} \right)$$

$$\frac{2+3.0}{5+7.0} = \frac{2}{5}$$

$$\text{Solução} = \infty$$

$$9) \lim_{x \rightarrow +\infty} \frac{(3x^2 - 6x)}{4x - 8} = \lim_{x \rightarrow +\infty} \frac{3x^2 - 6x}{4x - 8} = \lim_{x \rightarrow +\infty} \frac{(3x^2 - 6x)}{4x} = \lim_{x \rightarrow +\infty} \left(3 - \frac{6}{x} \right) = +\infty$$

Solução: D.D.

$$1) \lim_{x \rightarrow +\infty} \frac{(-2x^3 + 2x^2 + 3)}{3x^3 + 3x^2 - 5x} : x^3 = \frac{-2 - \frac{2}{x^2} + \frac{3}{x^3}}{3 + \frac{3}{x} - \frac{5}{x^2}}$$

$$\frac{\lim_{x \rightarrow +\infty} \left[-2 - \frac{2}{x^2} + \frac{3}{x^3} \right]}{\lim_{x \rightarrow +\infty} \left[3 + \frac{3}{x} - \frac{5}{x^2} \right]} = -\frac{2}{3}$$

Exercício exercício

$$a) \lim_{x \rightarrow 2} \frac{x^5 + 1}{x^2 + 1}$$

$$\begin{aligned} & x_0 = 2 \cdot x^2 + 1 \\ & (-1)^3 + 1 = 0 \\ & \frac{(-1)^5 + 1}{(-1)^2 + 1} \end{aligned}$$

$$b) \lim_{x \rightarrow -1} \frac{x^2 - 1}{x^2 + 3x + 2}$$

$$\lim_{x \rightarrow -1} (x^2 - 1) \rightarrow 0$$

$$\begin{aligned} & \lim_{x \rightarrow -1} (x^2 + 3x + 2) \neq 0 \\ & \lim_{x \rightarrow -1} \left(\frac{x^2 - 1}{x^2 + 3x + 2} \right) = \frac{-1 - 1}{-1 + 2} = -2 \end{aligned}$$

$$c) \lim_{x \rightarrow -1} \frac{x^2 - 2x}{x^2 + 4x + 4}$$

$$\frac{(-1)^2 - 2 \cdot (-1)}{(-1)^2 + 4 \cdot (-1) + 4} = \frac{1}{3}$$

$$d) \lim_{x \rightarrow 1} \frac{x^3 - 3x + 2}{x^2 - 4x + 3}$$

$$\lim_{x \rightarrow 1} x^3 - 3x + 2 \neq 0$$

$$\lim_{x \rightarrow 1} x^2 - 4x + 3 \neq 0$$

$$\lim_{x \rightarrow 1} \left(\frac{x^2}{x^2 - 4x + 3} \right) \rightarrow \frac{1+2}{1^2 + 2 \cdot 1 + 3} = \frac{3}{6} = \frac{1}{2}$$

$$e) \lim_{x \rightarrow a} \frac{x^2 - (a+1)x + a}{x^3 - a^3}$$

$$\lim_{x \rightarrow a} \frac{x(x-a)}{(x-a)(x^2+ax+a^2)(x-a)(x^2+ax+a^2)}$$

$$\frac{a^2}{a^2+a^2+a^2} \rightarrow \frac{a^2}{3a^2}$$

$$5) \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$$

$$\lim_{h \rightarrow 0} \frac{x^3 + 3x^2h + 3xh^2 + h^3 - x^3}{h}$$

$$\lim_{h \rightarrow 0} 3x^2 + 3x \cdot 0 + 0^2 = 3x^2$$

$$g) \lim_{x \rightarrow 1} \left[\frac{\frac{1}{1-x} - \frac{3}{1-x^3}}{1-x} \right] \quad \lim_{x \rightarrow 1} \left(\frac{\frac{1}{1-x} - \frac{3}{1-x^3}}{1-x} \right) \rightarrow 0$$

Solução -11

$$\lim_{x \rightarrow 1} \frac{\sqrt{x-1}}{x-1}$$

$$\lim_{x \rightarrow 1} (\sqrt{x-1}) = 0$$

$$\lim_{x \rightarrow 1} (x-1) = 0$$

$$\lim_{x \rightarrow 1} \left(\frac{1}{\sqrt{x+1}} \right) \frac{1}{|x-1|} = \frac{1}{2}$$

d) $\lim_{x \rightarrow 1} \frac{\sqrt{x^2 - 2\sqrt{x+1}}}{(x-1)^2}$

$$\lim_{x \rightarrow 1} \sqrt{x^2 - 2\sqrt{x+1}} = 0$$

$$\lim_{x \rightarrow 1} (x-1)^2 = 0$$

$$\lim_{x \rightarrow 1^-} \frac{1}{(\sqrt{x^2} + \sqrt{x+1})^2} = \frac{1}{9}$$

$$\left. \begin{aligned} & \lim_{x \rightarrow 1} \frac{\sqrt{x+1}}{\sqrt{x-1}} \\ & x=0 \text{ for } \frac{\sqrt{64-64}}{\sqrt{64-16}} = 0 \end{aligned} \right\}$$