(2) Aplicações ⇒ PÁGINA 165 DO LIVRO MATEMÁTICA PARA OS CURSOS DE ECONOMIA, ADMINISTRAÇÃO E CIÊNCIAS CONTÁBEIS (MEDEIROS, 5ª EDIÇÃO, EDITORA ATLAS)

(1.1) $\frac{C(x)}{x}$

$\frac{10.000 + 2x + \frac{1}{10}x^2}{x}$

$\frac{10.000}{x} + \frac{2x}{x} + \frac{\frac{1}{10}x^2}{10x}$

$10.000 + 2 + \frac{1}{10}x$

2.2 $C(x) = 10.000 + 2x + \frac{1}{10}x^2$; $0 \in X$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 10.000$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = 10.000 + 2x + \frac{1}{10}x^2$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{10.000 + 2x + \frac{1}{10}x^2 - 10.000}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{100.000 + 20x + x^2 - 100.000}{10}}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{20x + x^2}{10}}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{20x + x^2}{10} \cdot \frac{1}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{x(20 + x)}{10} \cdot \frac{1}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{20 + x}{10}$$

$$\frac{\Delta y}{\Delta x} = \frac{20}{10} + \frac{x}{10}$$

$$\frac{\Delta y}{\Delta x} = 2 + \frac{x}{10}$$

2.1 $\frac{C(x)}{x} \rightarrow 2 + \frac{100}{x}$

$$\frac{2x + 100}{x}$$

$$\frac{2x}{x} + \frac{100}{x}$$

2.1 $C(x) = 2x + 100$; $0 \in X$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 100$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = 2x + 100$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

1760

$\frac{\Delta y}{\Delta x} = \frac{2x + 100 - 100}{x}$ $\quad C_{VM} = \frac{\Delta y}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{2x}{x}$ $\quad C_{VM} = 2$

$\frac{\Delta y}{\Delta x} = 2$

2.2 $C(x)$

x

$\sqrt{2x+10} + 50$

x

$C(x) = \sqrt{2x+10} + 50 \; ; \quad 0 \in x$

$x_0 = 0 \qquad \Delta x = x - 0 \qquad f(0) = \sqrt{10} + 50$

$x_0 + \Delta x = x \qquad \Delta x = x \qquad f(x) = \sqrt{2x+10} + 50$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\sqrt{2x+10} + 50 - (\sqrt{10} + 50)}{x}$

$\frac{\Delta y}{\Delta x} = \frac{\sqrt{2x+10} + 50 - \sqrt{10} - 50}{x}$

$\frac{\Delta y}{\Delta x} = \frac{\sqrt{2x+10} - \sqrt{10}}{x} \cdot \frac{\sqrt{2x+10} + \sqrt{10}}{\sqrt{2x+10} + \sqrt{10}}$

$\frac{\Delta y}{\Delta x} = \frac{2x + 10 - 10}{x(\sqrt{2x+10} + \sqrt{10})}$

$\frac{\Delta y}{\Delta x} = \frac{2x}{x(\sqrt{2x+10} + \sqrt{10})}$

$\frac{\Delta y}{\Delta x} = \frac{2}{\sqrt{2x+10} + \sqrt{10}}$

$C_{VM} = \frac{\Delta y}{\Delta x}$

$C_{VM} = \frac{2}{\sqrt{2x+10} + \sqrt{10}}$

FORON:

2.3 $\frac{C(x)}{x}$

$\frac{\frac{1}{20}x^3 - 5x^2 + 8x + 100}{x}$

$\frac{\frac{1}{20}x^3}{x} - \frac{5x^2}{x} + \frac{8x}{x} + \frac{100}{x}$

$\frac{1}{20}x^3 \cdot \frac{1}{x} - 5x + 8 + \frac{100}{x}$

$\rightarrow \frac{1}{20}x^2 - 5x + 8 + \frac{100}{x}$

$C(x) = \frac{1}{20}x^3 - 5x^2 + 8x + 100, \quad 0 \in X$

$x_0 = 0 \qquad \Delta x = x - 0 \qquad f(0) = 100$

$x_0 + \Delta x = x \qquad \Delta x = x \qquad f(x) = \frac{1}{20}x^3 - 5x^2 + 8x + 100$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{1}{20}x^3 - 5x^2 + 8x + 100 - 100}{x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{x^3 - 100x^2 + 160x}{20}}{x}$

$\frac{\Delta y}{\Delta x} = \frac{x^3 - 100x^2 + 160x}{20} \cdot \frac{1}{x}$

$\rightarrow \frac{\Delta y}{\Delta x} = \frac{x(x^2 - 100x + 160)}{20} \cdot \frac{1}{x}$

$\frac{\Delta y}{\Delta x} = \frac{x^2 - 100x + 160}{20}$

$\frac{\Delta y}{\Delta x} = \frac{x^2}{20} - \frac{100x}{20} + \frac{160}{20}$

$\frac{\Delta y}{\Delta x} = \frac{x^2}{20} - 5x + 8$

$C_{vm} = \frac{\Delta y}{\Delta x}$

$C_{vm} = \frac{x^2}{20} - 5x + 8$

2.4 $\frac{C(x)}{x}$

$\frac{0{,}2x\left(\frac{x+5}{x+3}\right) + 250}{x}$

$0{,}2x\left(\frac{x+5}{x+3}\right) \cdot \frac{1}{x} + 250 \cdot \frac{1}{x}$

$\rightarrow 0{,}2\left(\frac{x+5}{x+3}\right) + \frac{250}{x}$

1762

$C(x) = 0{,}2x\left(\frac{x+5}{x+3}\right) + 250 \;;\; 0 \le x$

$x_0 = 0 \qquad \Delta x = x - 0 \qquad f(0) = 250$

$x_0 + \Delta x = x \qquad \Delta x = x \qquad f(x) = 0{,}2x\left(\frac{x+5}{x+3}\right) + 250$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{0{,}2x\left(\frac{x+5}{x+3}\right) + 250 - 250}{x}$$

$$\frac{\Delta y}{\Delta x} = 0{,}2x\left(\frac{x+5}{x+3}\right).\frac{1}{x}$$

$$\rightarrow \frac{\Delta y}{\Delta x} = 0{,}2\left(\frac{x+5}{x+3}\right) \qquad C_{vm} = \frac{\Delta y}{\Delta x}$$

$$C_{vm} = 0{,}2\left(\frac{x+5}{x+3}\right)$$

2.5) $\frac{C(x)}{x}$

$$\frac{0{,}1x^2\left(\frac{x+90}{x+12}\right) + 350}{x}$$

$$0{,}1x^2\left(\frac{x+90}{x+12}\right) + 350.\frac{1}{x}$$

$$\rightarrow 0{,}1x^2\left(\frac{x+90}{x+12}\right).\frac{1}{x} + 350.\frac{1}{x}$$

$$0{,}1x\left(\frac{x+90}{x+12}\right) + \frac{350}{x}$$

$C(x) = 0{,}1x^2\left(\frac{x+90}{x+12}\right) + 350 \;;\; 0 \le x$

$x_0 = 0 \qquad \Delta x = x - 0 \qquad f(0) = 350$

$x_0 + \Delta x = x \qquad \Delta x = x \qquad f(x) = 0{,}1x^2\left(\frac{x+90}{x+12}\right) + 350$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x)-f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{0{,}1x^2\left(\frac{x+10}{x+12}\right)+350-350}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{0{,}1x^2\left(\frac{x+10}{x+12}\right)}{x}$$

$$\frac{\Delta y}{\Delta x} = 0{,}1x^2\left(\frac{x+10}{x+12}\right)\cdot\frac{1}{x}$$

$$\frac{\Delta y}{\Delta x} = 0{,}1x\left(\frac{x+10}{x+12}\right)$$

$$C_{vm} = \frac{\Delta y}{\Delta x}$$

$$C_{vm} = 0{,}1x\left(\frac{x+10}{x+12}\right)$$

2.6 $C(x)$

x

$\frac{150e^{0,1x}}{x}$ → $\frac{150}{x}e^{0,1x}$

$C(x) = 150e^{0,1x}$; $0 \le x$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 150$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = 150e^{0,1x}$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x)-f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{150e^{0,1x}-150}{x}$$

$$C_{vm} = \frac{\Delta y}{\Delta x}$$

$$C_{vm} = \frac{150e^{0,1x}-150}{x}$$

3.7 $x = 10 - p$

$p = 10 - x$

$R_T = p \cdot Q$

$R_T = (10-x)x$

$R_T = 10x - x^2$

$R_T = 10x - x^2$; $0 \le x$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 0$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = 10x - x^2$

1161

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{10x - x^2 - 0}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{10x - x^2}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{x(10-x)}{x}$$

$$\frac{\Delta y}{\Delta x} = 10 - x$$

$$R_M = \frac{\Delta y}{\Delta x}$$

$$R_M = 10 - x$$

5.1

$$x = \frac{200}{p+5} - 10$$

$$x(p+5) = 200 - 10(p+5)$$

$$xp + 5x = 200 - 10p - 50$$

$$xp + 5x = 150 - 10p$$

$$xp + 10p = 150 - 5x$$

$$p(x+10) = 150 - 5x$$

$$p = \frac{150 - 5x}{x+10}$$

$$R_T = p \cdot Q$$

$$R_T = \left(\frac{150-5x}{x+10}\right) x$$

$$R_T = \frac{150x - 5x^2}{x+10}$$

$$R_T = \frac{150x - 5x^2}{x+10}, \quad 0 \leq x$$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 0$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = \frac{150x - 5x^2}{x+10}$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{150x - 5x^2}{x+10} - 0}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{150x - 5x^2}{x+10}}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{150x - 5x^2}{x+10} \cdot \frac{1}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{x(150-5x)}{x+10} \cdot \frac{1}{x}$$

$$\frac{\Delta y}{\Delta x} = \frac{150 - 5x}{x+10}$$

$$R_M = \frac{\Delta y}{\Delta x}$$

$$R_M = \frac{150 - 5x}{x+10}$$

1.2 $x = \frac{100 - p^2}{5}$

$5x = 100 - p^2$

$p^2 = 100 - 5x$

$p = \sqrt{100 - 5x}$

$R_T = p \cdot Q$

$R_T = \sqrt{100 - 5x} \cdot x$

$R_T = x\sqrt{100 - 5x}$

$R_T = x\sqrt{100 - 5x}$; $0 \leq x$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 0$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = x\sqrt{100 - 5x}$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{x\sqrt{100 - 5x} - 0}{x}$

$\frac{\Delta y}{\Delta x} = \frac{x\sqrt{100 - 5x}}{x}$

$\frac{\Delta y}{\Delta x} = \sqrt{100 - 5x}$

$R_M = \frac{\Delta y}{\Delta x}$

$R_M = \sqrt{100 - 5x}$

1.3 $x = \frac{10 - \sqrt{p}}{2}$

$2x = 10 - \sqrt{p}$

$\sqrt{p} = 10 - 2x$

$(\sqrt{p})^2 = (10 - 2x)^2$

$p = (10 - 2x)^2$

$R_T = p \cdot Q$

$R_T = (10 - 2x)^2 x$

$R_T = x(10 - 2x)^2$

$R_T = x(10 - 2x)^2$; $0 \leq x$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 0$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = x(10 - 2x)^2$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$ $\quad R_M = \frac{\Delta y}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{x(10-2x)^2 - 0}{x}$ $\quad R_M = (10-2x)^2$

$\frac{\Delta y}{\Delta x} = \frac{x(10-2x)^2}{x}$

$\frac{\Delta y}{\Delta x} = (10-2x)^2$

5.4 $x = 10 - 0,2p$

$0,2p = 10 - x$

$p = \frac{10-x}{0,2}$

$R_T = p \cdot Q$

$R_T = \left(\frac{10-x}{0,2}\right) x$

$R_T = \frac{10x - x^2}{\frac{2}{10}}$

$R_T = \frac{10x - x^2}{\frac{1}{5}}$

$\rightarrow R_T = (10x - x^2)\,5$

$R_T = 50x - 5x^2$

$R_T = 50x - 5x^2 \; ; \; 0 \leq x$

$x_0 = 0$ $\quad \Delta x = x - 0$ $\quad f(0) = 0$

$x_0 + \Delta x = x$ $\quad \Delta x = x$ $\quad f(x) = 50x - 5x^2$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$ $\quad R_M = \frac{\Delta y}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{50x - 5x^2 - 0}{x}$ $\quad R_M = 50 - 5x$

$\frac{\Delta y}{\Delta x} = \frac{50x - 5x^2}{x}$

$\frac{\Delta y}{\Delta x} = \frac{x(50-5x)}{x} \Rightarrow \frac{\Delta y}{\Delta x} = 50 - 5x$

* PÁGINA 173 DO LIVRO MATEMÁTICA 1 PARA OS CURSOS DE ECONOMIA, ADMINISTRAÇÃO E CIÊNCIAS CONTÁBEIS (MEDEIROS, 5ª EDIÇÃO, EDITORA ATLAS)

1671

(3) Derivada de uma função num ponto *

(3.1) $y = 5$; $x_0 = 4$

$x_0 = x_0$ $\quad f(x_0) = 5$ $\quad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = 5$ $\quad \Delta x = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x} \qquad y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{5 - 5}{\Delta x} \qquad y' = \lim_{\Delta x \to 0} 0$$

$$\frac{\Delta y}{\Delta x} = \frac{0}{\Delta x} \qquad y' = 0$$

$$\frac{\Delta y}{\Delta x} = 0$$

(3.2) $y = 3x$; $x_0 = 2$

$x_0 = x_0$ $\quad f(x_0) = 3x_0$ $\quad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = 3x_0 + 3\Delta x$ $\quad \Delta x = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x} \qquad y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{3x_0 + 3\Delta x - 3x_0}{\Delta x} \qquad y' = \lim_{\Delta x \to 0} 3$$

$$\frac{\Delta y}{\Delta x} = \frac{3\Delta x}{\Delta x} \qquad y' = 3$$

$$\frac{\Delta y}{\Delta x} = 3$$

1168

1.3 $y = 2x + 1$; $x_0 = -3$

$x_0 = x_0$ $\quad f(x_0) = 2x_0 + 1$ $\quad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = 2x_0 + 2\Delta x + 1$ $\quad \Delta x = \Delta x$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$ $\quad y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{2x_0 + 2\Delta x + 1 - (2x_0 + 1)}{\Delta x}$ $\quad y' = \lim_{\Delta x \to 0} 2$

$\frac{\Delta y}{\Delta x} = \frac{2x_0 + 2\Delta x + 1 - 2x_0 - 1}{\Delta x}$ $\quad y' = 2$

$\frac{\Delta y}{\Delta x} = \frac{2\Delta x}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 2$

1.5 $y = x^2 + 5$; $x_0 = \frac{1}{2}$

$x_0 = x_0$ $\quad f(x_0) = x_0^2 + 5$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = (x_0 + \Delta x)^2 + 5 = x_0^2 + 2x_0\Delta x + \Delta x^2 + 5$

$\Delta x = x_0 + \Delta x - x_0$

$\Delta x = \Delta x$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{x_0^2 + 2x_0\Delta x + \Delta x^2 + 5 - (x_0^2 + 5)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{x_0^2 + 2x_0\Delta x + \Delta x^2 + 5 - x_0^2 - 5}{\Delta x}$

$\rightarrow \frac{\Delta y}{\Delta x} = \frac{2x_0\Delta x + \Delta x^2}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\Delta x(2x_0 + \Delta x)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 2x_0 + \Delta x$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} 2x_0 + \Delta x$

$y' = 2x_0$

No ponto $x_0 = \frac{1}{2}$

$y' = 2x_0$

$y' = 2 \cdot \frac{1}{2}$

$y' = 1$

1.5 $y = \frac{1}{x}$; $x_0 = -2$

$x_0 = x_0$

$x_0 + \Delta x = x_0 + \Delta x$

$f(x_0) = \frac{1}{x_0}$

$f(x_0 + \Delta x) = \frac{1}{x_0 + \Delta x}$

$\Delta x = x_0 + \Delta x - x_0$

$\Delta x = \Delta x$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{1}{x_0 + \Delta x} - \frac{1}{x_0}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0 - (x_0 + \Delta x)}{x_0 (x_0 + \Delta x)}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0 - x_0 - \Delta x}{x_0 (x_0 + \Delta x)}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{-\Delta x}{x_0 (x_0 + \Delta x)}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{-\Delta x}{x_0 (x_0 + \Delta x)} \cdot \frac{1}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{-1}{x_0 (x_0 + \Delta x)}$

$\frac{\Delta y}{\Delta x} = \frac{-1}{x_0^2 + x_0 \Delta x}$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} \frac{-1}{x_0^2 + x_0 \Delta x}$

$y' = \frac{-1}{x_0^2}$

No ponto $x_0 = -2$

$y' = \frac{-1}{(-2)^2}$

$y' = -\frac{1}{4}$

1701

1.6 $y = \frac{x}{x+1}$; $x_0 = 3$

$x_0 = x_0$

$x_0 + \Delta x = x_0 + \Delta x$

$f(x_0) = \frac{x_0}{x_0+1}$

$f(x_0+\Delta x) = \frac{x_0+\Delta x}{x_0+\Delta x+1}$

$\Delta x = x_0 + \Delta x - x_0$

$\Delta x = \Delta x$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0+\Delta x}{x_0+\Delta x+1} - \frac{x_0}{x_0+1}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{(x_0+\Delta x)(x_0+1) - x_0(x_0+\Delta x+1)}{(x_0+1)(x_0+\Delta x+1)}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0^2 + x_0 + x_0\Delta x + \Delta x - x_0^2 - x_0\Delta x - x_0}{(x_0+1)(x_0+\Delta x+1)}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\frac{\Delta x}{(x_0+1)(x_0+\Delta x+1)}}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\Delta x}{(x_0+1)(x_0+\Delta x+1)} \cdot \frac{1}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{1}{(x_0+1)(x_0+\Delta x+1)}$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} \frac{1}{(x_0+1)(x_0+\Delta x+1)}$

$y' = \frac{1}{(x_0+1)(x_0+1)}$

$y' = \frac{1}{(x_0+1)^2}$

No ponto $x_0 = 3$

$y' = \frac{1}{(3+1)^2}$

$y' = \frac{1}{(4)^2}$

$y' = \frac{1}{16}$

1.7 $y = 1 - x^2$; $x_0 = 0$

$x_0 = x_0$ $\quad f(x_0) = 1 - x_0^2$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = 1 - (x_0 + \Delta x)^2 = 1 - (x_0^2 + 2x_0\Delta x + \Delta x^2)$

$1 - x_0^2 - 2x_0\Delta x - \Delta x^2$

$\Delta x = x_0 + \Delta x - x_0$

$\Delta x = \Delta x$

$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{1 - x_0^2 - 2x_0\Delta x - \Delta x^2 - (1 - x_0^2)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{1 - x_0^2 - 2x_0\Delta x - \Delta x^2 - 1 + x_0^2}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{-2x_0\Delta x - \Delta x^2}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\Delta x(-2x_0 - \Delta x)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = -2x_0 - \Delta x$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} -2x_0 - \Delta x$

$y' = -2x_0$

No ponto $x_0 = 0$

$y' = -2 \cdot 0$

$y' = 0$

1.8 $y = 3x^2 + 10x - 1$; $x_0 = 1$

$x_0 = x_0$ $\quad f(x_0) = 3x_0^2 + 10x_0 - 1$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = 3(x_0 + \Delta x)^2 + 10x_0 + 10\Delta x - 1$

$f(x_0 + \Delta x) = 3(x_0^2 + 2x_0\Delta x + \Delta x^2) + 10x_0 + 10\Delta x - 1$

$f(x_0 + \Delta x) = 3x_0^2 + 6x_0\Delta x + 2\Delta x^2 + 10x_0 + 10\Delta x - 1$

172

$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{3x_0^2 + 6x_0\Delta x + 2\Delta x^2 + 10x_0 + 10\Delta x - 7 - (3x_0^2 + 10x_0 - 7)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{3x_0^2 + 6x_0\Delta x + 2\Delta x^2 + 10x_0 + 10\Delta x - 7 - 3x_0^2 - 10x_0 + 7}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{6x_0\Delta x + 2\Delta x^2 + 10\Delta x}{\Delta x}$

$\frac{\Delta y}{\Delta x} = \frac{\Delta x(6x_0 + 2\Delta x + 10)}{\Delta x}$

$\frac{\Delta y}{\Delta x} = 6x_0 + 2\Delta x + 10$

$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$

$y' = \lim_{\Delta x \to 0} 6x_0 + 2\Delta x + 10$

$y' = 6x_0 + 10$

No ponto $x_0 = 1$

$y' = 6 \cdot 1 + 10$

$y' = 6 + 10$

$y' = 16$

2.1 $\Delta y = 0 \cdot \Delta x$

$[3,9; 4,1]$ $\Delta y = 0(0,2) = 0$

$[3,85; 4,15]$ $\Delta y = 0(0,3) = 0$

2.2 $\Delta y = 3\Delta x$

$[1,9; 2,1]$ $\Delta y = 3(0,2) = 0,6$

$[1,85; 2,15]$ $\Delta y = 3(0,3) = 0,9$

2.3 $\Delta y = 2\Delta x$

$[-2,85; -3,15]$ $\Delta y = 2(-0,3) = -0,6$

$[-2,9; -3,1]$ $\Delta y = 2(0,2) = -0,4$

2.4 $\Delta y = 1\Delta x$

$[0,45; 0,55]$ $\Delta y = 0,1$

$[0,50; 0,60]$ $\Delta y = 0,2$

2.5 $\Delta y = -\frac{1}{4}\Delta x$

$[-1,85; -2,15]$ $\Delta y = -\frac{1}{4}(0,3) = -\frac{1}{4}\cdot\frac{3}{10} = -\frac{3}{40}$

$[-1,90; -2,10]$ $\Delta y = -\frac{1}{4}(-0,2) = -\frac{1}{4}\cdot\frac{-2}{10} = -\frac{1}{4}\cdot\frac{-1}{5} = \frac{1}{20}$

2.6 $\Delta y = \frac{1}{16}\Delta x$

$[2,90; 3,10]$ $\Delta y = \frac{1}{16}\cdot 0,2 = \frac{1}{16}\cdot\frac{2}{10} = \frac{1}{16}\cdot\frac{1}{5} = \frac{1}{90}$

$[2,85; 3,15]$ $\Delta y = \frac{1}{16}\cdot 0,3 = \frac{1}{16}\cdot\frac{3}{10} = \frac{3}{160}$

2.7 $\Delta y = 0\Delta x$

$\Delta y = 0$

2.8 $\Delta y = 16\Delta x$

$[0,9; 1,10]$ $\quad \Delta y = 16(0,2) = 3,2$

$[0,85; 1,15]$ $\quad \Delta y = 16(0,3) = 4,8$

3.1 $y = \sqrt{x}$; $x_0 = 0$

$x_0 = x_0$ $\quad f(x_0) = \sqrt{x_0}$ $\quad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = \sqrt{x_0 + \Delta x}$ $\quad \Delta x = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\sqrt{x_0 + \Delta x} - \sqrt{x_0}}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} \frac{\sqrt{x_0 + \Delta x} - \sqrt{x_0}}{\Delta x}$$

EM MATEMÁTICA NÃO EXISTE DIVISÃO POR ZERO. LOGO NÃO EXISTIRÁ DERIVADA PARA ESTA FUNÇÃO.

3.2 $y = \frac{1}{x}$; $x_0 = 0$

$x_0 = x_0$ $\quad f(x_0) = \frac{1}{x_0}$ $\quad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = \frac{1}{x_0 + \Delta x}$ $\quad \Delta x = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{1}{x_0 + \Delta x} - \frac{1}{x_0}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0 - (x_0+\Delta x)}{x_0(x_0+\Delta x)}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0 - x_0 - \Delta x}{x_0(x_0+\Delta x)}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{-\Delta x}{x_0(x_0+\Delta x)}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{-\Delta x}{x_0(x_0+\Delta x)} \cdot \frac{1}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{-1}{x_0(x_0+\Delta x)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-1}{x_0^2 + x_0 \Delta x}$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} \frac{-1}{x_0^2 + x_0 \Delta x}$$

$$y' = \frac{-1}{x_0^2}$$

No ponto $x_0 = 0$

$$y' = \frac{-1}{(0)^2}$$

NA MATEMÁTICA NÃO EXISTE DIVISÃO POR ZERO. LOGO NÃO EXISTIRÁ A DERIVADA DESTA FUNÇÃO.

5.1 $y = x \quad ; \quad 0 \leq x \leq 5$

$x_0 = x_0 \qquad f(x_0) = x_0 \qquad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x \qquad f(x_0 + \Delta x) = x_0 + \Delta x \qquad \Delta x = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{x_0 + \Delta x - x_0}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\Delta x}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = 1$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} 1$$

$$y' = 1$$

No ponto $x_0 = 0$ No ponto $x_0 = 5$

$y' = 1$ $y' = 1$

1176

$f'(0+) = 1$ $\quad \Delta y = \Delta x$

$f'(5-) = 1$

1.2 $y = x^2 + 10$; $1 \le x \le 7$

$x_0 = x_0$ $\quad f(x_0) = x_0^2 + 10$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = (x_0 + \Delta x)^2 + 10 = x_0^2 + 2x_0\Delta x + \Delta x^2 + 10$

$\Delta x = x_0 + \Delta x - x_0$

$\Delta x = \Delta x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0 + \Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{x_0^2 + 2x_0\Delta x + \Delta x^2 + 10 - (x_0^2 + 10)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{x_0^2 + 2x_0\Delta x + \Delta x^2 + 10 - x_0^2 - 10}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{2x_0\Delta x + \Delta x^2}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\Delta x(2x_0 + \Delta x)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = 2x_0 + \Delta x$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} 2x_0 + \Delta x$$

$y' = 2x_0$

No ponto $x_0 = 1$: $y' = 2 \cdot 1$, $y' = 8$

No ponto $x_0 = 7$: $y' = 2 \cdot 7$, $y' = 14$

$f'(1+) = 8$ $\quad \Delta y = 8\Delta x$

$f'(7-) = 14$ $\quad \Delta y = 14\Delta x$

1.3 $y = \frac{1}{x}$; $-3 \le x \le 1$

$x_0 = x_0$ $\quad f(x_0) = \frac{1}{x_0}$ $\quad \Delta x = x_0 + \Delta x - x_0$

$x_0 + \Delta x = x_0 + \Delta x$ $\quad f(x_0 + \Delta x) = \frac{1}{x_0 + \Delta x}$ $\quad \Delta x = \Delta x$

1171

$$\frac{\Delta y}{\Delta x} = \frac{f(x_0+\Delta x) - f(x_0)}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{1}{x_0+\Delta x} - \frac{1}{x_0}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0 - (x_0+\Delta x)}{x_0(x_0+\Delta x)}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{x_0 - x_0 - \Delta x}{x_0(x_0+\Delta x)}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{\frac{-\Delta x}{x_0(x_0+\Delta x)}}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{-\Delta x}{x_0(x_0+\Delta x)} \cdot \frac{1}{\Delta x}$$

$$\frac{\Delta y}{\Delta x} = \frac{-1}{x_0(x_0+\Delta x)}$$

$$\frac{\Delta y}{\Delta x} = \frac{-1}{x_0^2 + x_0 \Delta x}$$

$$y' = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x}$$

$$y' = \lim_{\Delta x \to 0} \frac{-1}{x_0^2 + x_0 \Delta x}$$

$$y' = -\frac{1}{x_0^2}$$

No ponto $x_0 = -3$

$$y' = -\frac{1}{(-3)^2}$$

$$y' = -\frac{1}{9}$$

$$f'(-3+) = -\frac{1}{9}$$

$$\Delta y = -\frac{1}{9}\Delta x$$

No ponto $x_0 = -1$

$$y' = -\frac{1}{(-1)^2}$$

$$y' = -\frac{1}{1}$$

$$y' = -1$$

$$f'(-1-) = -1$$

$$\Delta y = -\Delta x$$