

Números Críticos

Dada uma função $f(x)$, números críticos são números que satisfazem $f'(x) = 0$

29) $f(x) = 5x^2 + 4x$

$$f'(x) = 10x + 4 = 0 \Rightarrow 10x = -4 \Rightarrow x = \frac{-4}{10}$$

$$x_c = -\frac{2}{5}$$

30) $f(x) = x^3 + x^2 - x$

$$f'(x) = 3x^2 + 2x - 1 = 0 \quad a=3, b=2, c=-1$$

$$\Delta = b^2 - 4 \cdot a \cdot c$$

$$\Delta = 2^2 - 4 \cdot 3 \cdot (-1)$$

$$\Delta = 4 + 12$$

$$\Delta = 16$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a} \Rightarrow \frac{-2 \pm \sqrt{16}}{2 \cdot 3} = \frac{-2 \pm 4}{6}$$

$$x_c = -1 \quad x_c = 1$$

$$x' = \frac{-2+4}{6} = \frac{2}{6} = \frac{1}{3}$$

$$x'' = \frac{-2-4}{6} = \frac{-6}{6} = -1$$

$$31) f(x) = x^3 + 3x^2 - 24x$$

$$f'(x) = 3x^2 + 6x - 24 = 0 \quad (*)$$

$$f(x) = x^2 + 2x - 8 = 0 \quad a=1, b=2, c=-8$$

$$\Delta = b^2 - 4 \cdot a \cdot c$$

$$\Delta = 2^2 - 4 \cdot 1 \cdot (-8)$$

$$\Delta = 4 + 32$$

$$\Delta = 36$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a} = \frac{-2 \pm 6}{2} \quad \frac{-2-6}{2} = -4 \quad \frac{-2+6}{2} = 2$$

$$x_c = -4$$

$$x_c = 2$$

$$\frac{-2+6}{2} = 2$$

$$32) f(x) = x^3 + x^2 + x$$

$$f'(x) = 3x^2 + 2x + 1 = 0 \quad a=3, b=2, c=1$$

$$\Delta = b^2 - 4 \cdot a \cdot c$$

$$\Delta = 2^2 - 4 \cdot 3 \cdot 1$$

$$\Delta = 4 - 12$$

$$\Delta = -8 = \nexists \quad \nexists x_c$$

$$33) S = 3t^4 + 4t^3 - 6t^2$$

$$S' = 12t^3 + 12t^2 - 12t = 0$$

$$12t \cdot (t^2 + t - 1) = 0 \quad a=1, b=1, c=-1$$

$$t_0 = 0 \quad \Delta = b^2 - 4 \cdot a \cdot c$$

$$\Delta = 1^2 - 4 \cdot 1 \cdot (-1)$$

$$\Delta = 1 + 4$$

$$\Delta = 5$$

$$t = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a} = t = \frac{-1 \pm \sqrt{5}}{2 \cdot 1} =$$

$$t_0 = \frac{-1 + \sqrt{5}}{2}$$

$$t_0 = \frac{-1 - \sqrt{5}}{2}$$