

Graficando polinômios de terceiro grau



$$f(x) = x^3 + 5x^2 + 3x + 3$$

$$g(x) = x^3 + 5x^2 + 3x + 1$$

$$h(x) = x^3 + 5x^2 + 3x + 5$$

$$f'(x) = g'(x) = h'(x) = 3x^2 + 10x + 3$$

$$x_{1,2} = \frac{-5 \pm 4}{3} = \begin{cases} -3 \\ -1/3 \end{cases}$$

PONTO DE INFLEXÃO

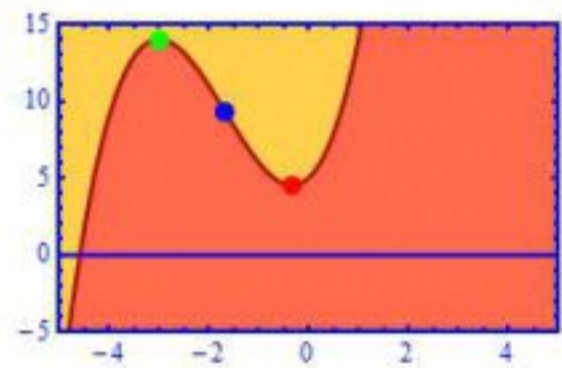
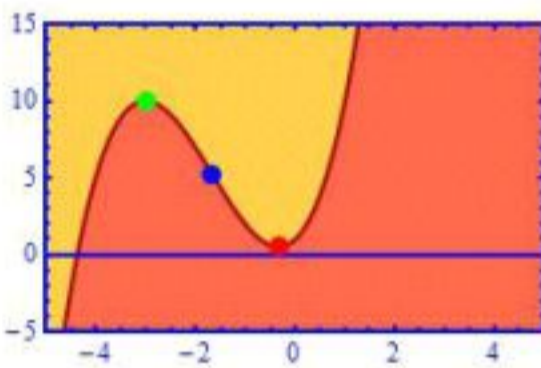
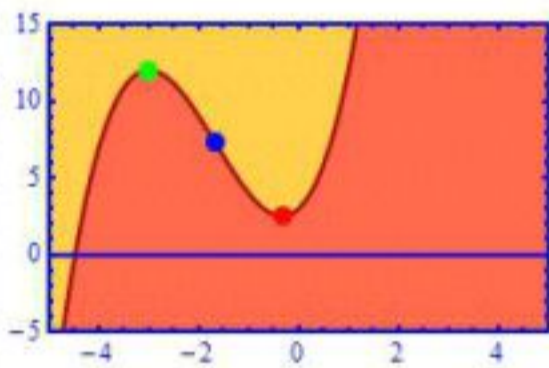
$$x = -5/3$$

MÁXIMOS
MÍNIMOS

$$f(x) \begin{matrix} (-3, 12) \\ (-1/3, 68/27) \end{matrix}$$

$$g(x) \begin{matrix} (-3, 10) \\ (-1/3, 14/27) \end{matrix}$$

$$h(x) \begin{matrix} (-3, 14) \\ (-1/3, 122/27) \end{matrix}$$



$$f(x) = x^3 + 5x^2 + 3x + 3$$

$$g(x) = x^3 + 4x^2 + 3x + 3$$

$$h(x) = x^3 + 3x^2 + 3x + 3$$

DERIVADAS
PRIMEIRAS

$$3x^2 + 10x + 3 = 0$$

$$3x^2 + 8x + 3 = 0$$

$$3x^2 + 6x + 3 = 0$$

SEGUNDAS

$$x = -5/3$$

$$x = -4/3$$

$$x = -1$$

PONTO DE INFLEXÃO

MAX (-3, 12)
MIN (-1/3, 2.52)
INF (-5/3, 7.26)

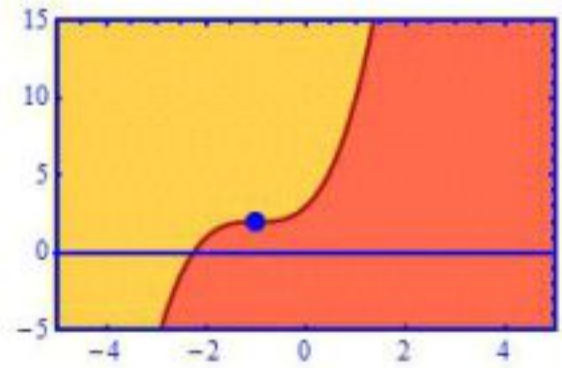
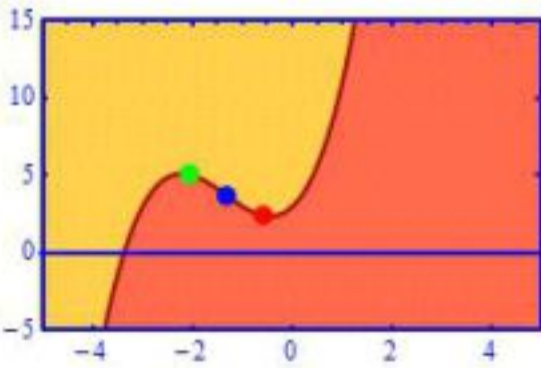
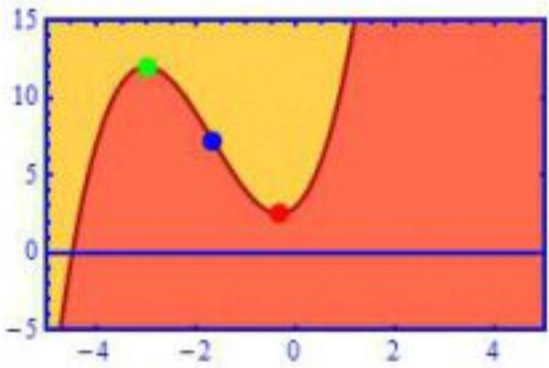
f(x)

$[(-4-5)/\sqrt{3}, 5.07]$
 $[(-4+5)/\sqrt{3}, 2.42]$
 $[-4/3, 3.74]$

g(x)

*
*
[-1, 2]

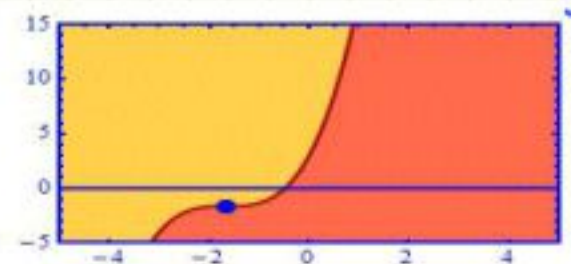
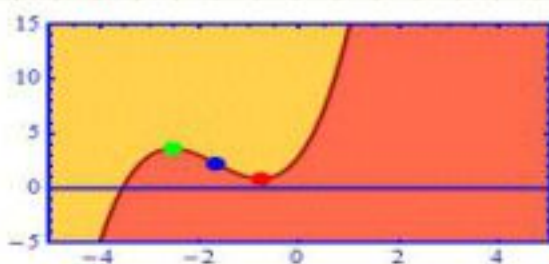
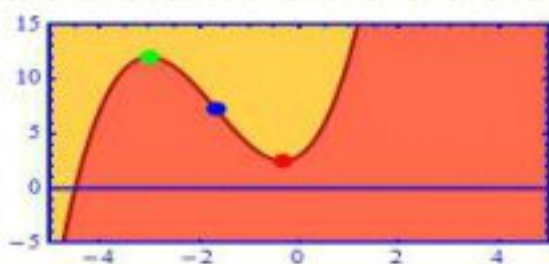
h(x)



$$f(x) = x^3 + 5x^2 + 3x + 3$$

$$g(x) = x^3 + 5x^2 + 6x + 3$$

$$h(x) = x^3 + 5x^2 + \frac{25}{3}x + 3$$



POUNO DE INFLEXÃO SEMPRE É $x = -5/3$

MAX E MÍNIMOS

$$\frac{-5 \pm \sqrt{25-9}}{3}$$

$$\frac{-5 \pm \sqrt{25-18}}{3}$$

$$\frac{-5 \pm \sqrt{25-25}}{3}$$

$$g(x) \left(\frac{-5-\sqrt{7}}{3}, 3.63 \right)_{max}$$

$$\left(\frac{-5+\sqrt{7}}{3}, 0.89 \right)_{min}$$

$$\left(-\frac{5}{3}, 2.26 \right)_F$$

h(x)

~~max~~ ~~min~~
POUNO DE INFLEXÃO

$$\left(-1, -\frac{4}{3} \right)$$

$$f(x) = -(x+1)^3 - 3(x+3)^2 + 12x + 28$$

$$\begin{aligned} f'(x) &= -3(x+1)^2(x+1)' - 6(x+3)(x+1)' + 12 \\ &= -3x^2 - 6x - 3 - 6x - 18 + 12 \\ &= -3x^2 - 12x - 9 \end{aligned}$$

$$f'(x) = 0 \Rightarrow \begin{aligned} x^2 + 4x + 3 &= 0 \\ (x+1)(x+3) &= 0 \end{aligned}$$

$$\boxed{x = -3} \\ \boxed{x = -1}$$

$$f''(x) = -6x - 12$$

$$f''(x) = 0$$

$$\boxed{x = -2}$$



$$f(0) = -1 - 27 + 28 = 0$$

$$f(-3) = 8 - 36 + 28 = 0$$

$$f(-1) = -12 - 12 + 28 = 4$$

$$f(-2) = 1 - 3 - 24 + 28 = 2$$

MÍNIMO (-3, 0)

MÁXIMO (-1, 4)

FLEXO (-2, 2)

