

MATI - Matemática - Prof Luciano
 CTA 141 - Automação Industrial
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"Função do 2º grau"

1) $f(x) = x^2 + bx + c$

$\hookrightarrow (0, 0)$

$c = 0$

$\hookrightarrow (1, 2)$

$2 = 1 + b + c$

$b = 1$

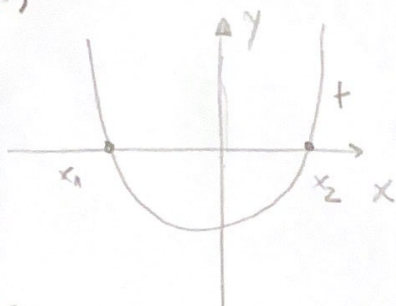
x, y
 $(0, 0)$
 $(1, 2)$

$f(-2/3) = (-2/3)^2 + (-2/3) + 0$

$= \frac{4}{9} - \frac{2}{3} = \frac{4-6}{9} = -\frac{2}{9} //$

R: letra A

3.)



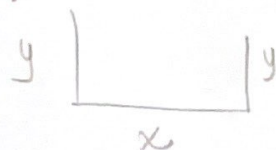
$a > 0$, determina a concavidade

$y = 0, x = x_1 \text{ ou } x = x_2$

$y > 0, x < x_1 \text{ ou } x > x_2$

$y < 0, x_1 < x < x_2$

4)



$A = x \cdot y$

$P = 2y + x \rightarrow 5000 = 2y + x$

$\hookrightarrow y = \frac{5000 - x}{2}$

$A = x \cdot \left(\frac{5000 - x}{2} \right)$

$A = \frac{5000x}{2} - \frac{x^2}{2} \Rightarrow A = 2500x - \frac{1}{2}x^2$

R: letra A

$$5) f(x) = 2x^2 - 24x + 1$$

$$a = 2$$

$$b = -24$$

$$c = 1$$

$$\Delta = b^2 - 4ac$$

$$= (-24)^2 - 4 \cdot 2 \cdot 1$$

$$= 576 - 8$$

$$= 568$$

ponto de mín. determinado por x_v , então:

$$x_v = -\frac{\Delta}{4a} \Rightarrow -\frac{568}{8} = -71$$

R: letra C

$$6) V(x) = 2x^2 + x$$

$$C(x) = 3x^2 - 15x + 21$$

$$L(x) = V(x) - C(x) \Rightarrow L(x) = 2x^2 + x - (3x^2 - 15x + 21)$$

$$\Rightarrow L(x) = 2x^2 + x - 3x^2 + 15x - 21$$

$$= 2x^2 - 3x^2 + 15x + x - 21$$

$$= -x^2 + 16x - 21$$

$$a = -1$$

$$b = 16$$

$$c = -21$$

valor de máx é determinado por x_v , então:

$$x_v = -\frac{b}{2a} = -\frac{16}{2 \cdot (-1)} = +8$$

R: letra D

8)

$$a) f(x) = x^2 - 6x + 9 \quad \begin{cases} a=1 & c=9 \\ b=-6 \end{cases} \quad \begin{array}{c|c} x & y \\ \hline 0 & 9 \\ 3 & 0 \end{array}$$

$$x=0$$

$$y = 0^2 - 6 \cdot 0 + 9 \quad \therefore (0, 9)$$

$$y = 9$$

$$y=0$$

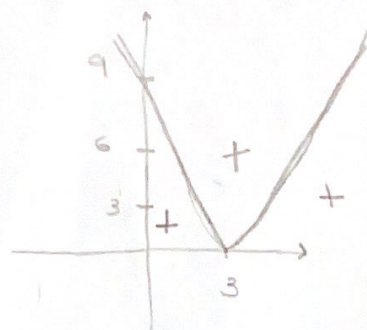
$$0 = x^2 - 6x + 9$$

$$\Delta = b^2 - 4ac$$

$$\Delta = 36 - 36 \quad \Delta = 0$$

$$x' = \frac{-b \pm \sqrt{\Delta}}{2a} \rightarrow x' = \frac{6 \pm 0}{2} = 3$$

$$\therefore (3, 0)$$



$$D(f) = \mathbb{R}$$

$$CD(f) = \mathbb{R}$$

$$\text{Im}(f) = \{y \in \mathbb{R} / y \geq 0\}$$

$$\text{ sinal: } y=0 \rightarrow x=3$$

$$y>0 \rightarrow x \neq -3$$

$$y<0 \rightarrow \text{não existe, função toda positiva}$$

$$b) f(x) = x^2 - 2x - 15 \rightarrow a>0, \text{ concavidade p/ cima}$$

$$\begin{cases} a=1 \\ b=-2 \end{cases} c=-15$$

$$y=0$$

$$0 = x^2 - 2x - 15$$

$$\Delta = 4 + 60$$

$$\Delta = 64$$

$$x = \frac{2 \pm \sqrt{64}}{2}$$

$$x' = \frac{2+8}{2} = 5$$

$$x'' = \frac{2-8}{2} = -3$$

$$x=0$$

$$y = 0^2 - 2 \cdot 0 - 15$$

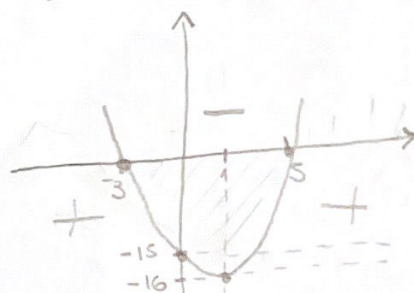
$$y = -15$$

vértice:

$$x = \frac{-3+5}{2} = \frac{2}{2} = 1$$

$$y = 1 - 2 - 15$$

$$y = -16$$



$$\text{ sinal: } y=0 \rightarrow x=-3 \text{ ou } x=5$$

$$y>0 \rightarrow x<-3 \text{ ou } x>5$$

$$y<0 \rightarrow -3<x<5$$

$$\text{Im}(f) = \{y \in \mathbb{R} / y \geq -16\}$$

$$D(f) \in \mathbb{R} \quad \text{cd}(f) \in \mathbb{R}$$

$$c) f(x) = -x^2 - 2x + 8$$

$$a=-1 \quad b=-2 \quad c=8$$

$$\rightarrow a<0, \text{ concavidade p/ baixo}$$

$$x=0$$

$$y = -0 - 2 \cdot 0 + 8$$

$$y = 8$$

x	y
0	8
-4	0
1	0

$$y=0$$

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

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

$$= 4 + 32$$

$$= 36$$

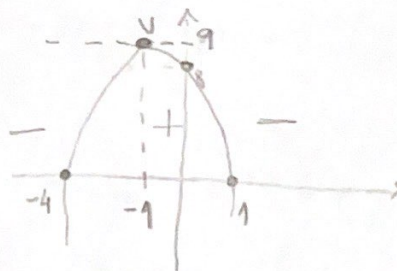
$$x = \frac{2 \pm \sqrt{36}}{-2}$$

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

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

$$\text{vértice: } x = \frac{-4+2}{2} = -1$$

$$y = -1 + 2 + 8 = 9$$



$$y=0 \rightarrow x=-4 \text{ ou } x=2$$

$$y>0 \rightarrow -4<x<2$$

$$y<0 \rightarrow x<-4 \text{ ou } x>2$$