

Exercícios



MESTRES
DA MATEMÁTICA

① Esboçar o gráfico de cada função quadrática:

a) $f(x) = x^2 - 5x + 6$

$a = 1$

$b = -5$

$c = 6$



conta o eixo y

• Raízes?

• vértice?

Raízes:

$$\Delta = (-5)^2 - 4 \cdot 1 \cdot 6 = 1$$

$$x = \frac{-(-5) \pm \sqrt{1}}{2 \cdot 1} = \frac{5 \pm 1}{2}$$

$x_1 = 2$
 $x_2 = 3$

• vértice $V(x_v, y_v)$

$$x_v = -\frac{b}{2a} = \frac{-(-5)}{2 \cdot 1} = \frac{5}{2}$$

$$y_v = -\frac{\Delta}{4a} = -\frac{1}{4 \cdot 1} = -\frac{1}{4}$$

$V\left(\frac{5}{2}; -\frac{1}{4}\right)$

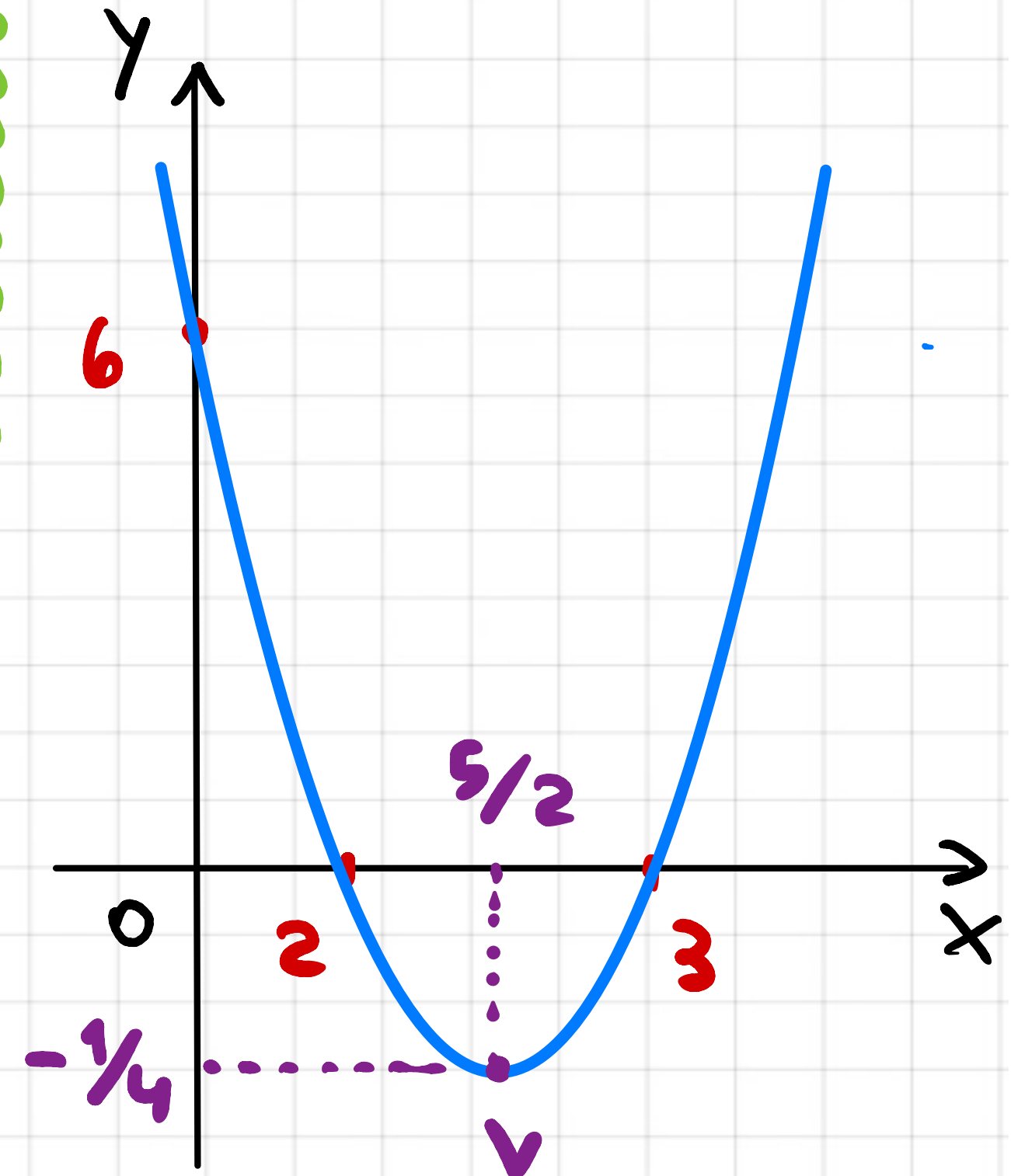
$$y = x^2 - 5x + 6$$

$a = 1$ $b = -5$ $c = 6$

Soma das raízes = $-\frac{b}{a} = -\frac{-5}{1} = 5$

Produto das raízes = $\frac{c}{a} = \frac{6}{1} = 6$

raízes:
2 e 3



$$b) f(x) = -x^2 + 7x - 6$$

$$a = -1$$

$$b = 7$$

$$c = -6$$

- Raízes:

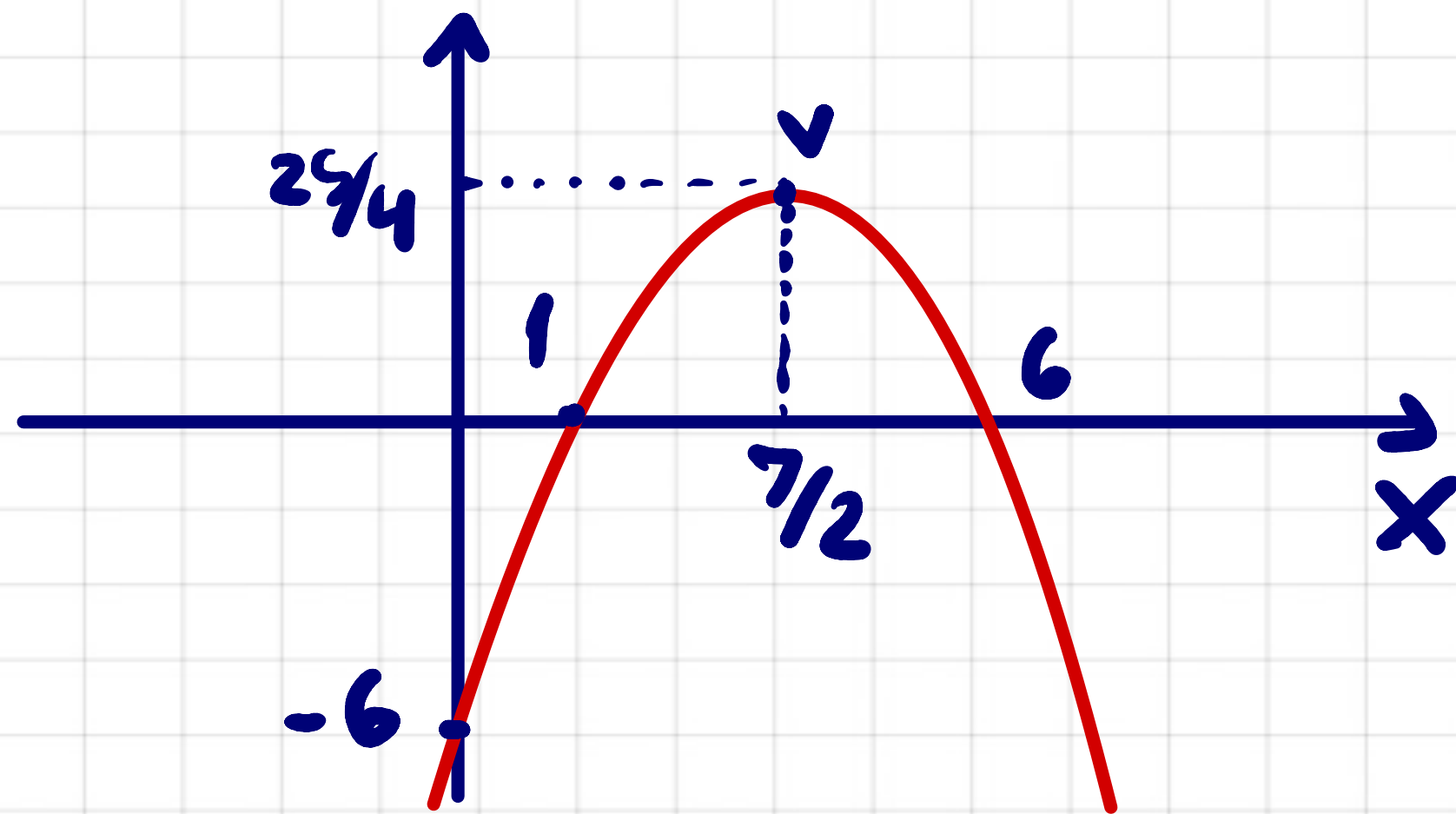
$$\Delta = 7^2 - 4 \cdot (-1) \cdot (-6) = 49 - 24 = 25$$

$$x = \frac{-7 \pm 5}{-2} \begin{cases} x_1 = 1 \\ x_2 = 6 \end{cases}$$

- Vértice $v(x_v, y_v)$

$$x_v = -\frac{b}{2a} = \frac{-7}{-2} = \frac{7}{2} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} v\left(\frac{7}{2}, \frac{25}{4}\right)$$

$$y_v = -\frac{\Delta}{4a} = -\frac{25}{-4} = \frac{25}{4}$$



$$c) f(x) = x^2 - 10x + 25$$

$$a = 1$$

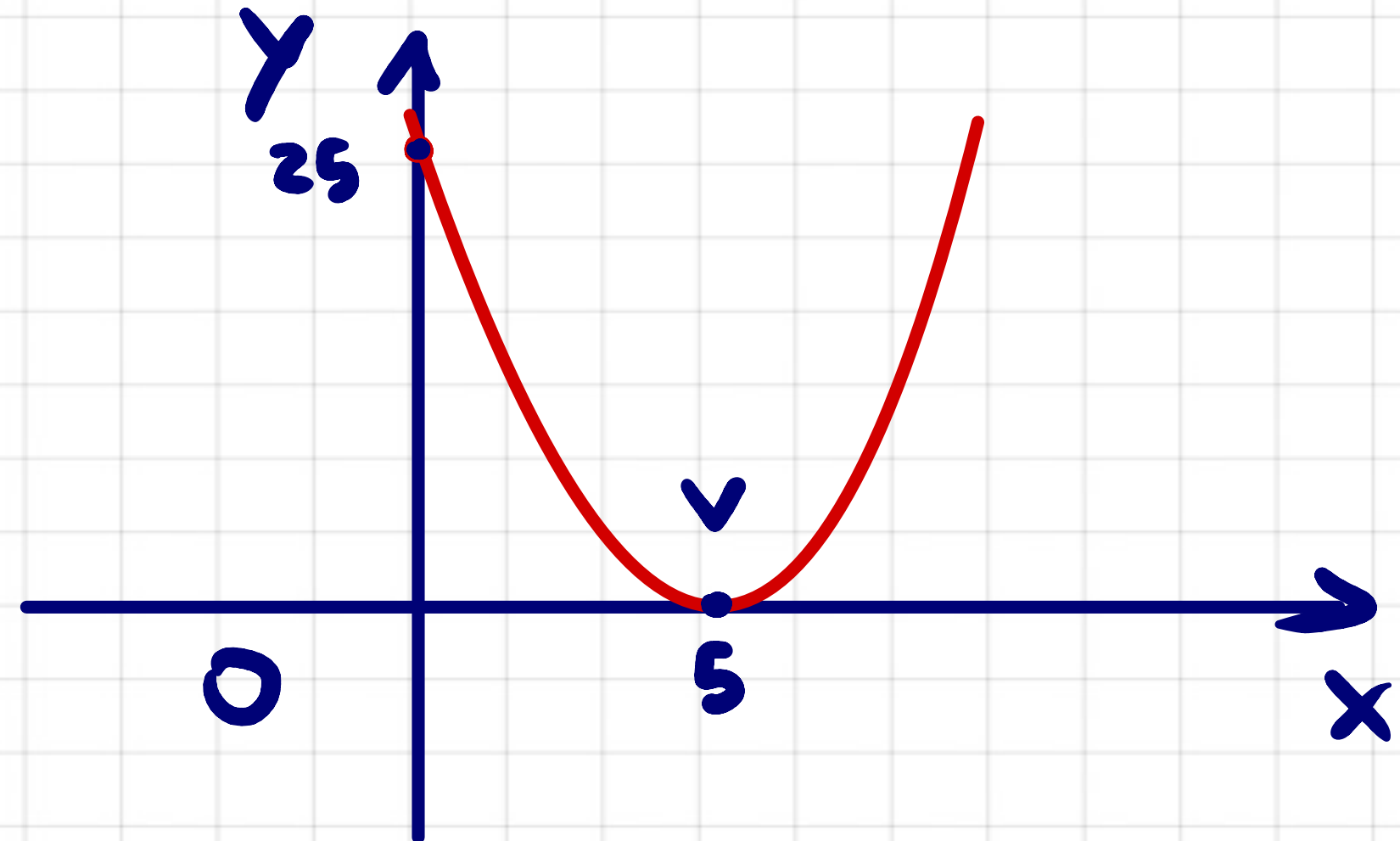
$$b = -10$$

$$c = 25$$

$$\Delta = (-10)^2 - 4 \cdot 1 \cdot 25 = 0$$

$$x = \frac{10 \pm 0}{2} = 5$$

$$\text{Vértice: } \begin{cases} x_v = -\frac{b}{2a} = 5 \\ y_v = -\frac{\Delta}{4a} = 0 \end{cases} \left. \begin{array}{l} \\ \\ \end{array} \right\} v(5, 0)$$





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

$a = -1$ $b = 3$ $c = 0$

RAÍZES:

$\Delta = 3^2 - 4 \cdot (-1) \cdot 0 = 9$

$x = \frac{-3 \pm 3}{-2}$ $\left\{ \begin{array}{l} x = 0 \\ x = 3 \end{array} \right.$

SEM FÓRMULA:

$-x^2 + 3x = 0$

$x(-x + 3) = 0$

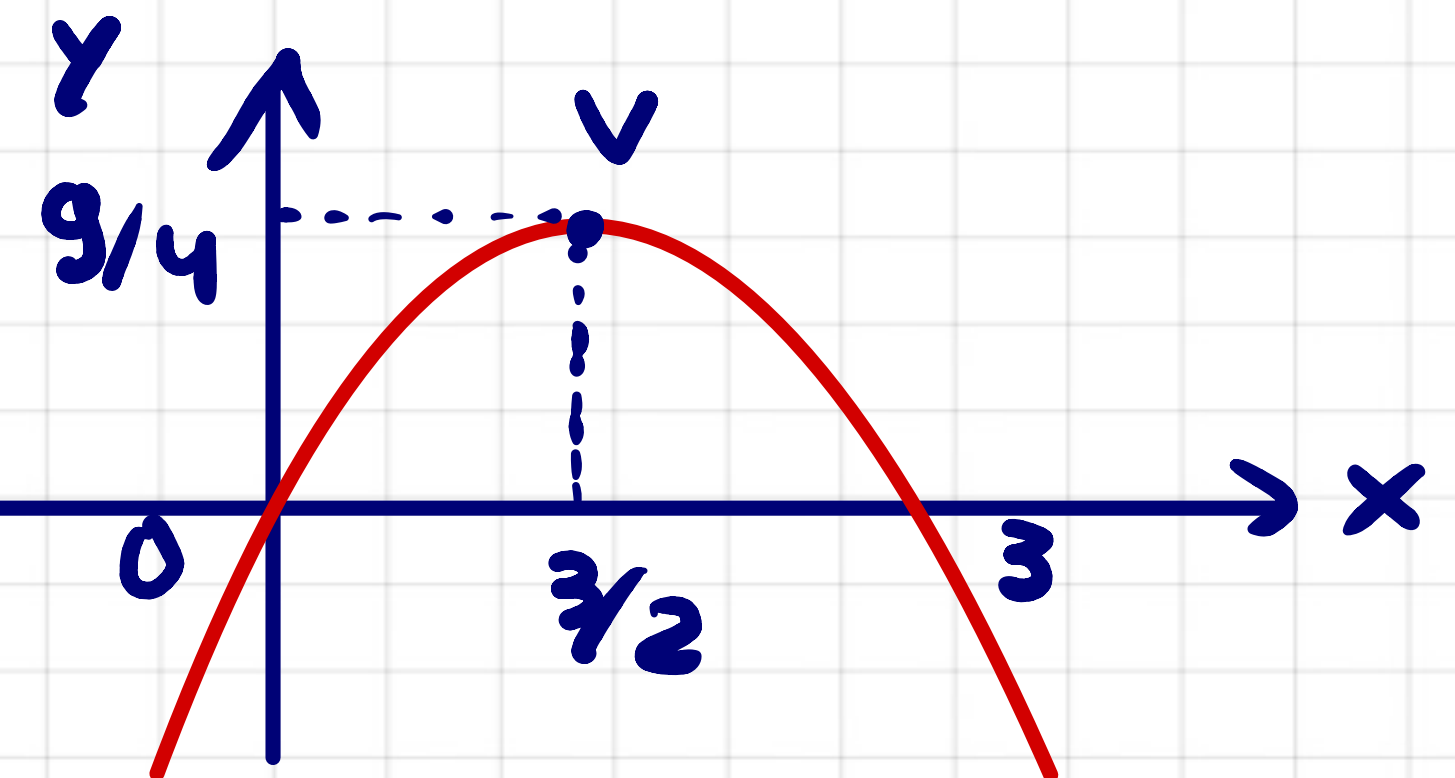
$x = 0$ ou $-x + 3 = 0$
 $x = 3$

VÊNTECE

$x_v = -\frac{b}{2a} = \frac{3}{2}$

$y_v = -\frac{\Delta}{4a} = \frac{9}{4}$

$v\left(\frac{3}{2}, \frac{9}{4}\right)$



d) $f(x) = x^2 - 4x + 5$

$a = 1$ $b = -4$ $c = 5$

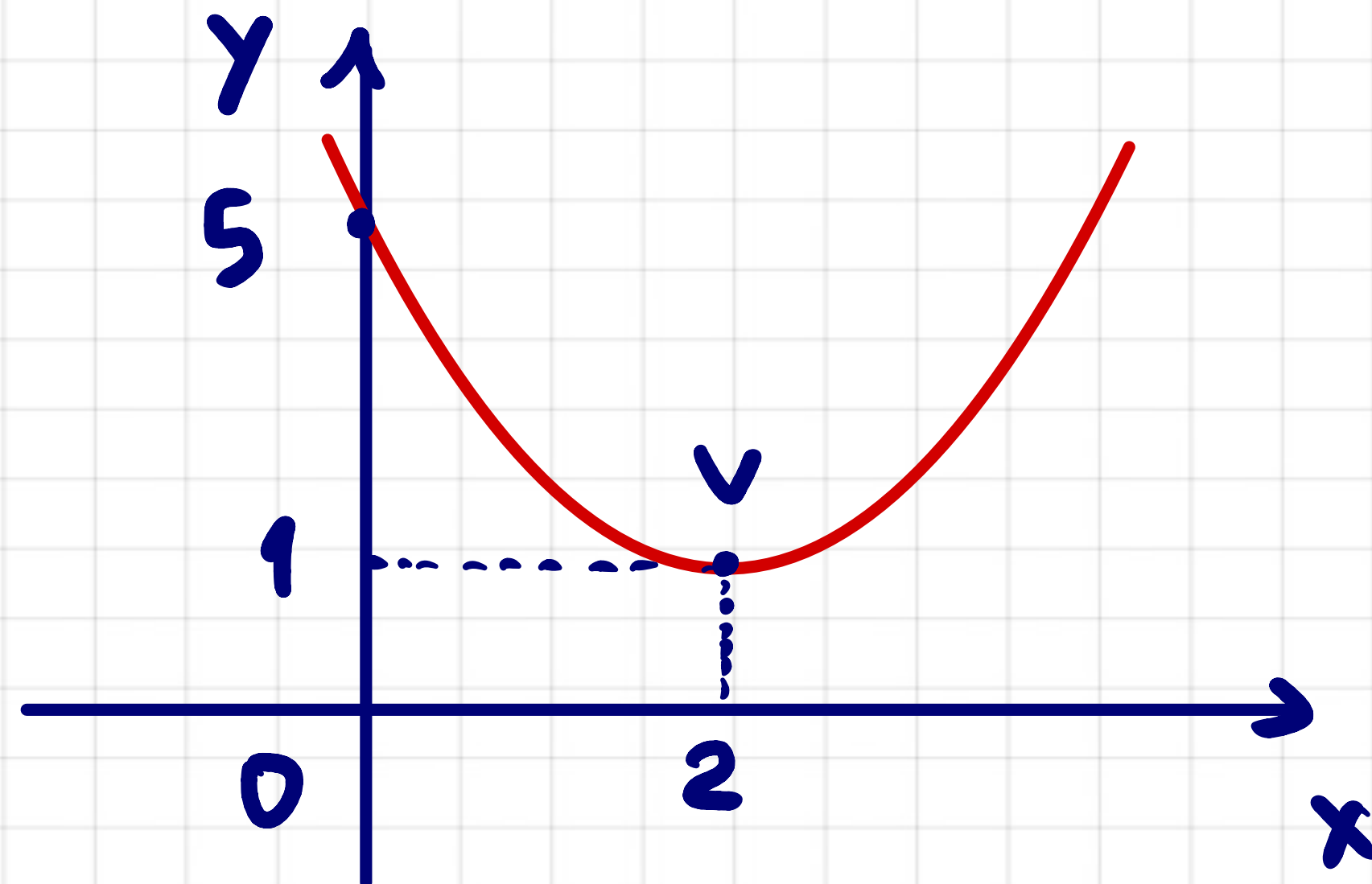
RAÍZES:

$\Delta = (-4)^2 - 4 \cdot 1 \cdot 5 = 16 - 20 = -4$

~~RAÍZES~~ REAIS

VÊNTECE: $x_v = -\frac{b}{2a} = 2$ $\left\{ \begin{array}{l} v(2, 1) \end{array} \right.$

$y_v = -\frac{\Delta}{4a} = 1$



$$f) f(x) = x^2 - 25$$

$$a = 1 \quad b = 0 \quad c = -25$$

raízes

$$\Delta = 0^2 - 4 \cdot 1 \cdot (-25) = 100$$

$$x = \frac{-0 \pm 10}{2} \quad \left\{ \begin{array}{l} x_1 = -5 \\ x_2 = 5 \end{array} \right.$$

sem fórmula:

$$x^2 - 25 = 0$$

$$x^2 = 25$$

$$x = \pm 5$$

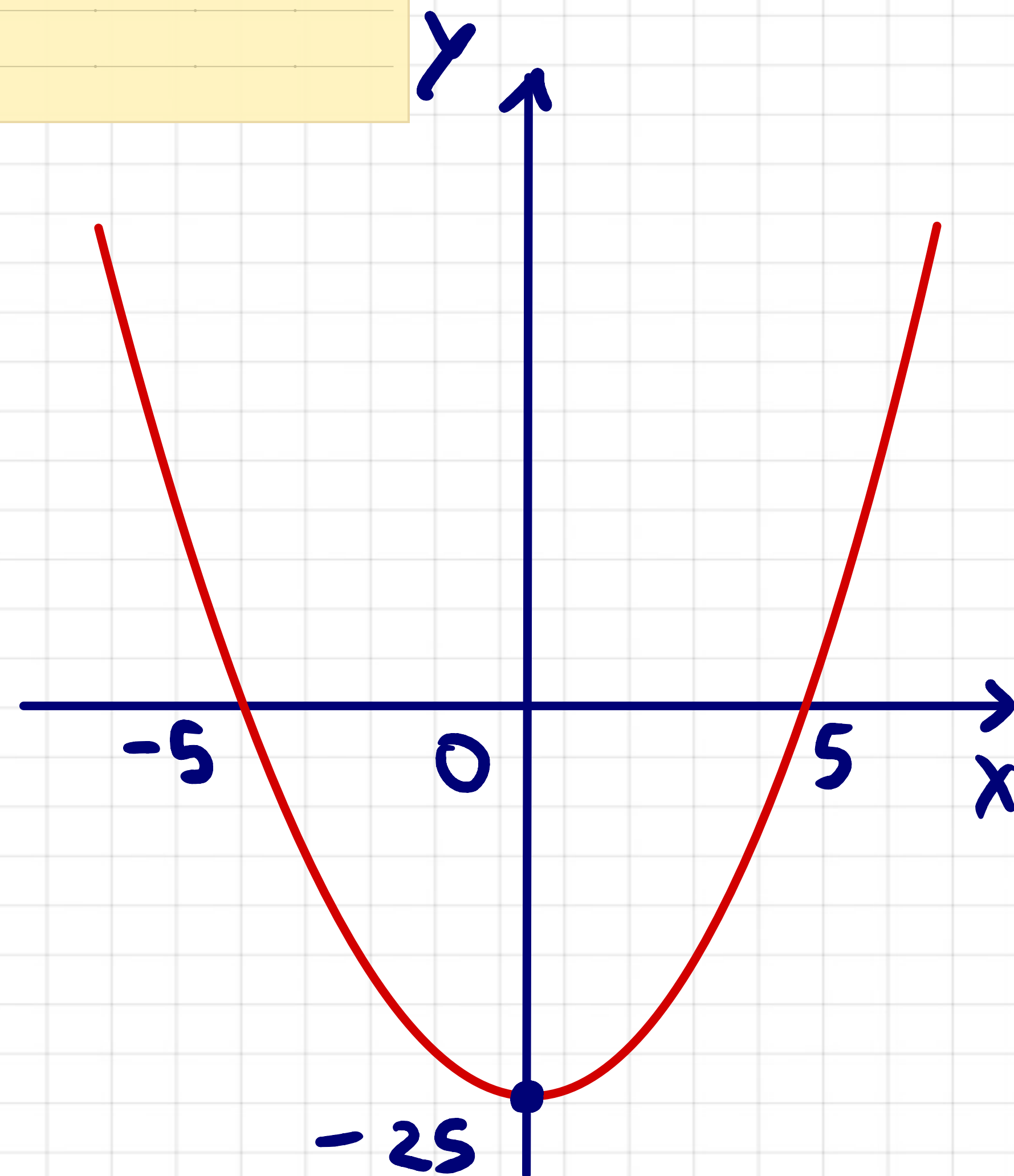
Vértice $v(x_v, y_v)$

$$x_v = -\frac{b}{2a} = 0$$

$$y_v = -\frac{\Delta}{4a} = -25$$

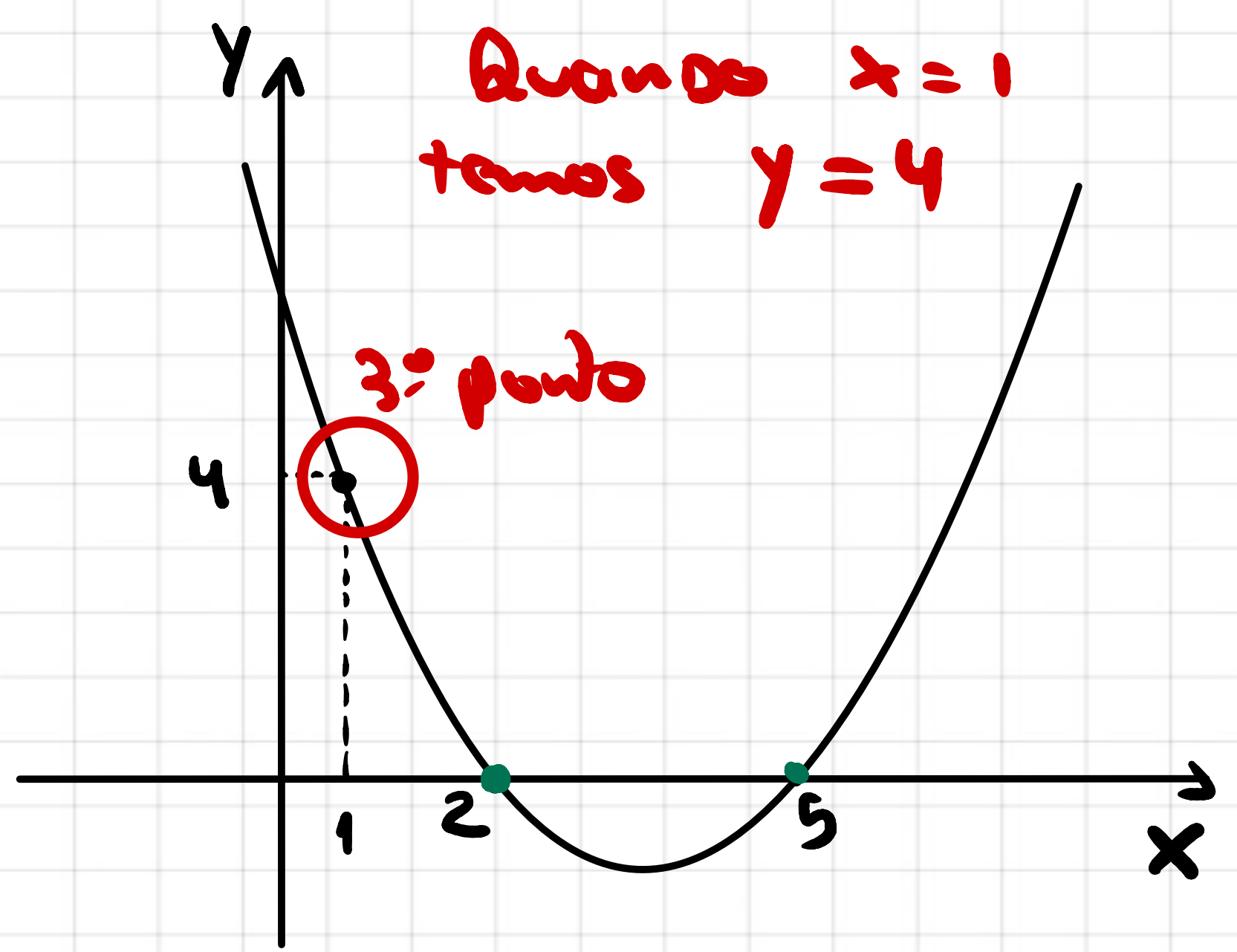
$v(0, -25)$

Se $b=0$, o
vértice encontra-se
no eixo x



② DE qual função quadrática matemática da expressão abaixo:

$a = ?$
 $b = ?$
 $c = ?$



Pontos:
 $(2, 0)$
 $(5, 0)$
 $(1, 4)$

1.º modo:

$$y = ax^2 + bx + c$$

Raízes: 2 e 5

• Soma das raízes = $-\frac{b}{a}$

$$7 = -\frac{b}{a}$$

$$-b = 7a \rightarrow \boxed{b = -7a}$$

• Produto das raízes = $\frac{c}{a}$

$$10 = \frac{c}{a} \rightarrow \boxed{c = 10a}$$

$$\therefore y = ax^2 - 7ax + 10a$$

Quando $x = 1$ temos $y = 4$.

$$4 = a \cdot 1^2 - 7a \cdot 1 + 10a$$

$$4 = 4a$$

$$\boxed{a = 1}$$

$$\boxed{b = -7}$$

$$\boxed{c = 10}$$

$$\therefore \boxed{y = x^2 - 7x + 10}$$