

# TESTE DE VERIFICAÇÃO: ÁLGEBRA

1-

$$a) (-3)^4$$

$$= 81$$

$$b) -3^4$$

$$= -81$$

$$c) 3^{-4}$$

$$= \frac{1}{81}$$

$$d) \frac{5^{23}}{5^{21}}$$

$$= 5^2$$

$$e) \left(\frac{2}{3}\right)^{-2}$$

$$= \left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

$$f) 16^{-\frac{3}{4}}$$

$$= 16^{-\frac{3}{4}}$$

$$= (2^4)^{-\frac{3}{4}}$$

$$= \frac{1}{(2^4)^{\frac{3}{4}}}$$

$$= \frac{1}{2^3}$$

$$= \frac{1}{8}$$

2-

$$a) \sqrt{200} - \sqrt{32}$$

$$\downarrow \quad \quad \downarrow$$

$$= \sqrt{10^2 \cdot 2} \quad = \sqrt{2^5}$$

$$= \sqrt{10^2} \cdot \sqrt{2} \quad = \sqrt{2^4} \cdot 2$$

$$= 10\sqrt{2} \quad = \sqrt{16} \cdot \sqrt{2}$$

$$\quad \quad = 4\sqrt{2}$$

$$\text{Logo, } 10\sqrt{2} - 4\sqrt{2}$$

$$= 6\sqrt{2}$$

$$b) (3a^3b^2)(4ab^2)^2$$

$$= (3a^3b^2)(16a^2b^4)$$

$$= 48a^5b^6$$

$$c) \left( \frac{3x^{\frac{3}{2}}y^3}{x^2y^{-\frac{3}{2}}} \right)^{-2}$$

$$= \left( \frac{3x^{\frac{3}{2}}y^3}{x^2y^{-\frac{3}{2}}} \right)^{-2}$$

$$= \frac{1}{\left( \frac{3x^{\frac{3}{2}}y^3}{x^2y^{-\frac{3}{2}}} \right)^2}$$

$$= \frac{1}{\frac{9x^{\frac{3}{2} \cdot 2}y^{3 \cdot 2}}{x^{2 \cdot 2}y^{(-\frac{3}{2}) \cdot 2}}}$$

$$= \frac{1}{\frac{9x^3y^6}{x^4y^{-3}}}$$

$$= \frac{1}{\frac{9x^3y^6}{x^4y^{-3}}}$$

$$= \frac{1}{\frac{9x^3y^6}{x^4y^{-3}}} \rightarrow \frac{x}{9y^9}$$

3-

$$a) 3(x+6) + 4(2x-5)$$

$$= 3x + 18 + 8x - 20$$

$$= 11x - 2$$

$$v) (x+3)(4x-5)$$

$$= 4x^2 - 5x + 12x - 15$$

$$4x^2 + 7x - 15 = 0$$

$$= 4x^2 + 7x - 15$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= (7)^2 - 4 \cdot 4 \cdot (-15)$$

$$= 49 + 240$$

$$= \sqrt{289}$$

$$= 17$$

$$\begin{array}{r} 3 \\ -36 \\ \hline 35 \\ 36+ \\ \hline 240 \end{array}$$

$$\begin{array}{r} 289/17 \\ 17 \quad 17 \\ \hline 319 \\ -319 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 289 \quad 17 \\ 1 \quad | \quad 17 \end{array}$$

$$\frac{-7 \pm \sqrt{\Delta}}{2 \cdot (4)}$$

$$\Delta \quad \frac{-7 + 17}{8} = \frac{10}{8}$$

$$\Delta \quad \frac{-7 - 17}{8} = \frac{-24}{8} = -3$$

$$c) (\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$$

↓

$$= (\sqrt{a})^2 - (\sqrt{b})^2$$

$$= (\sqrt{a} - \sqrt{b})(\sqrt{a} + \sqrt{b})$$

$$= (a - b)$$

$$d) (2x+3)^2$$

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

$$= 4x^2 + 6x + 6x + 9$$

$$\underline{\underline{4x^2 + 12x + 9}}$$

$$E) (x+2)^3$$

$$= (x+2)(x+2)(x+2)$$

↓

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

$$= x^3 + 4x^2 + 4x + 2x^2 + 8x + 8$$

$$x^3 + 6x^2 + 12x + 8$$

4-

$$a) \underline{4x^2 - 25}$$

$$\downarrow$$

$$= (2x)^2 - 5^2$$

$$= (2x-5)(2x+5)$$

$$b) 2x^2 + 5x - 12$$

$$25 - 4 \cdot 2 \cdot (-12) \rightarrow 2(x - \frac{3}{2})(x + 4)$$

$$25 + 96 = \sqrt{121} = 11$$

$$\frac{-5 \pm 11}{2 \cdot 2} \rightarrow \frac{6}{4} \rightarrow \frac{3}{2}$$

$$\rightarrow \frac{-16}{4} = -4$$

$$c) x^3 - 3x^2 - 4x + 12$$

$$= (x^3 - 3x^2) - (4x - 12)$$

$$x^2(x-3) - 4(x-3)$$

$$(x^2-4)(x-3)$$

$$\downarrow$$

$$(x-2)(x+2)(x-3)$$

$$d) x^2 + 27x$$

$$= x(x + 27)$$

$$E) 3x^{3/2} - 9x^{1/2} + 6x^{-1/2}$$

$$= x^{3/2} - 3x^{1/2} + 2x^{-1/2}$$

$$= x^{-1/2} (x^2 - 3x + 2)$$

$$\downarrow$$

$$x^{1/2} (x-2)(x-1)$$

$$f) x^3y - 4xy$$

$$= xy(x^2 - 4)$$

$$= xy(x-2)(x+2)$$

$$\text{ou } y(x^3 - 4x)$$

$$\downarrow$$

$$y \cdot x(x^2 - 4)$$

5-

$$a) \frac{x^2 + 3x + 2}{x^2 - x - 2}$$

$$= \frac{(x+2)(\cancel{x+1})}{(x-2)(\cancel{x+1})} = \frac{(x+2)}{(x-2)}$$

$$b) \frac{2x^2 - x - 3}{x^2 - 9} \cdot \frac{x+3}{2x+3}$$

$$\downarrow$$

$$= \frac{2x^2 - x - 3}{(\cancel{x+3})(x-3)} \cdot \frac{(\cancel{x+3})}{2x+3}$$

$$= \frac{2x^2 - x - 3}{(x-3)(2x+3)}$$

$$= \frac{(2x\cancel{+3})(x-3)}{(x-3)(2\cancel{x+3})}$$

$$= \frac{(x-3)}{(x-3)}$$

$$\frac{(-1)^2 - 4 \cdot 2 \cdot -3}{1+8}$$

$$\frac{1 \pm 3}{4} = \frac{4}{4} = 1$$

$$- \frac{2}{4} = -\frac{1}{2}$$

$$2(x-3)(x+\frac{1}{2})$$

$\downarrow$

$$2(x+\frac{1}{2})(x-3)$$

$\downarrow$

$$(2x+\frac{1}{2})(x-3)$$

$$c) \frac{x^2}{x^2-4} - \frac{x-1}{x+2}$$

$$= \frac{x^2}{x^2-4} - \frac{x+1}{x+2}$$

$$= \frac{x^2}{(x-2)(x+2)} - \frac{x+1}{x+2} \cdot \frac{(x-2)}{(x-2)}$$

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

$$= \frac{x^2 - (x^2 - 2x + x - 2)}{(x+2)(x-2)}$$

$$= \frac{(\cancel{x+2})}{(\cancel{x+2})(x-2)}$$

$$= \frac{1}{(x-2)}$$

$$d) \frac{\frac{y}{x} - \frac{x}{y}}{\frac{1}{y} - \frac{1}{x}}$$

$$\frac{\frac{1}{y} - \frac{1}{x}}{\frac{1}{y} - \frac{1}{x}}$$

$$= \frac{x \cdot \frac{1}{y} - \frac{1}{x} \cdot y}{x \cdot y} = \frac{x-y}{xy}$$

$$= \frac{\frac{y}{x} - \frac{x}{y}}{\frac{x-y}{xy}}$$

$$= \frac{y \cdot y - \frac{x \cdot x}{y \cdot x} \cdot \frac{xy}{x-y}}$$

$$= \frac{y^2 - x^2}{xy} \cdot \frac{xy}{x-y}$$

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

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

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

$$= -(y+x)$$

6-

$$a) \frac{\sqrt{10}}{\sqrt{5}-2}$$

$$\begin{array}{r} 50 \overline{) 2} \\ 25 \overline{) 5} 5 \\ 5 \overline{) 5} 5 \\ \hline \end{array} \quad \sqrt{50} = \sqrt{5 \cdot 5 \cdot 2} = 5 \cdot \sqrt{2}$$

$$= \frac{\sqrt{10}}{\sqrt{5}-2} \cdot \frac{\sqrt{5}+2}{\sqrt{5}+2} = \frac{\sqrt{10} \cdot \sqrt{5} + 2}{(\sqrt{5})^2 - 2^2} = \frac{\sqrt{10 \cdot 5} + 2}{5 - 4} = \frac{\sqrt{50} + 2}{1} = \frac{5\sqrt{2} + 2\sqrt{10}}{1}$$

$$b) \frac{\sqrt{4+h} - 2}{h}$$

$$= \frac{\sqrt{4+h} - 2}{h} \cdot \frac{\sqrt{4+h} + 2}{\sqrt{4+h} + 2} = \frac{(\sqrt{4+h})^2 - 2^2}{h(\sqrt{4+h} + 2)} = \frac{4+h-4}{h\sqrt{4+h}+2h} = \frac{1}{h\sqrt{4+h}+2h} \quad h \neq 0$$

7-

$$a) x^2 + x + 1$$

$$x^2 + bx + c \rightarrow x^2 + (a+b)x + ab \rightarrow (x+a)(x+b)$$

$$(x - x_0)^2 + y_0 \Rightarrow x^2 - 2x_0x + x_0^2 + y_0$$

$$= \left(x + \frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2$$

$$= \left(x^2 + 2 \cdot \left(\frac{1}{2}\right) \cdot x + \left(\frac{1}{2}\right)^2\right) + \frac{1}{4} + 1$$

$$= \left(x + \frac{1}{2}\right)^2 - \left(\frac{1}{4}\right) + 1$$

$$= \left(x + \frac{1}{2}\right)^2 + \frac{3}{4}$$

$$b) 2x^2 - 12x + 11$$

$$= 2(x^2 - 6x) + 11$$

↓

$$\left(x - \frac{6}{2}\right)^2 + \left(\frac{6}{2}\right)^2$$

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

$$x^2 - 6x + 9 = (x-3)^2$$

$$\Rightarrow (x-3)^2 - 9$$

$$\Rightarrow 2(x^2 - 6x + 9) - 9 = 2(x-3)^2 - 7$$

8-

$$a) \quad x+5 = 34 - \frac{1}{2}x$$

$$\Rightarrow \frac{1}{2}x + x + 5 = 34$$

$$\Rightarrow 2\left(\frac{1}{2}x + x + 5\right) = 34 \cdot 2$$

$$\Rightarrow x + 2x + 10 = 28$$

$$\Rightarrow 3x = 28 - 10$$

$$\Rightarrow x = \frac{28-10}{3} = 6$$

$$b) \quad \frac{2x}{x+1} = \frac{2x-1}{x}$$

$$= x \left( \frac{2x}{x+1} \right) = \frac{2x-1}{x} \cdot x$$

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

$$= 2x^2 = (2x-1)(x+1)$$

$$2x^2 = 2x^2 + 2x - x - 1$$

$$2x - x - 1 = 0$$

$$x - 1 = 0$$

$$x = 1$$

$$c) \quad x^2 - x - 12 = 0$$

$$(x+3)(x-4)$$

$$= (-3)^2 - 4 \cdot 1 \cdot (-12)$$

$$= 9 + 48 = \sqrt{49}$$

$$\frac{-(-1) \pm \sqrt{49}}{2 \cdot 1} \Rightarrow x' = \frac{8}{2} = 4$$

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

$$d) 2x^2 + 4x + 3 = 0$$

$$\begin{array}{l} \frac{x^2 + 2x + \frac{3}{2}}{2} \\ (x+1)^2 - \frac{1}{2} \\ (x^2 + 2 \cdot 1 \cdot x + 1^2) - \frac{1}{2} \\ \downarrow \\ (x+1)^2 + \frac{1}{2} \\ (x+1)^2 + \frac{1}{2} \end{array} \quad \begin{array}{l} (4)^2 - 4 \cdot 2 \cdot \frac{3}{2} \\ 16 - 6 = 10 \\ \frac{-4 \pm \sqrt{10}}{2 \cdot 2} = \frac{-4 \pm \sqrt{10}}{4} \\ \frac{-4 - 2\sqrt{10}}{4} \\ \text{ou} \\ \frac{-4 + 2\sqrt{10}}{4} \\ x_1 = -1 + \frac{\sqrt{10}}{2} \quad x_{11} = -1 - \frac{\sqrt{10}}{2} \end{array}$$

$$E) x^4 - 3x^2 + 2 = 0$$

$$= x^4 - 3x^2 + 2 = 0$$

$$y = x^2$$

$$y^2 - 3y + 2 = 0$$

$$\Rightarrow (-3) \pm 4 \cdot 1 \cdot 2$$

$$\Rightarrow 9 - 8 = 1$$

$$\begin{array}{l} \frac{-(-3) \pm \sqrt{1}}{2 \cdot 1} = \frac{3 \pm 1}{2} \\ \frac{3+1}{2} = 2 \quad \swarrow \sqrt{2} \\ \frac{3-1}{2} = 1 \quad \searrow \sqrt{2} \\ \downarrow \\ y = x^2 \end{array}$$

$$f) 3|x-4| = 10$$

$$|x-4| = \begin{cases} x > 0, (x-4) \\ x < 0, -(x-4) \end{cases}$$

$$x > 0$$

$$x < 0$$

$$3x - 12 = 10$$

$$-3x + 12 = 10$$

$$3x = 22$$

$$-3x = -2$$

$$x = \frac{22}{3}$$

$$x = \frac{2}{3}$$

$$S = \left[ \frac{22}{3}, \frac{2}{3} \right]$$

$$g) 2x(4-x)^{-1/2} - 3\sqrt{4-x} = 0$$

$$= \frac{2x}{(4-x)^{3/2}} - 3(4-x)^{1/2} = 0$$

$$\Rightarrow \frac{2x}{(4-x)^{3/2}} = 3(4-x)^{1/2} \cdot (4-x)^{3/2} \\ \sqrt{4-x} \cdot \sqrt{4-x} = (4-x)$$

$$\Rightarrow 2x = 3(4-x)$$

$$= 2x = 12 - 3x$$

$$= 5x = 12$$

$$x = \frac{12}{5}$$

9 -

$$a) -4 < 5 - 3x \leq 17$$

$$-4 < 5 - 3x \leq 17$$

Caso 1:

$$5 - 3x \leq 17$$

$$-3x \leq 17 - 5$$

$$-3x \leq 12$$

$$x \leq \frac{-12}{-3}$$

$$x \leq -4$$

Caso 2:

$$5 - 3x > -4$$

$$-3x > -9$$

$$\frac{-3x}{-3} > \frac{-9}{-3}$$

$$x > 3$$

$$S: [-4, 3)$$

$$b) x^2 < 2x + 8$$

Caso  $x > 0$

$$x^2 - 2x - 8 > 0$$

$$4 + -2 = 2$$

$$(-2, 4)$$

$$4 \cdot -2 = -8$$



$$c) x(x-1)(x+2) > 0$$

$$x \neq 0, x \neq 1 \text{ e } x \neq -2$$

$$\begin{array}{|c|c|} \hline -2 & 0 \\ \hline \end{array}$$

$$1$$

$$(-2, 0) \cup (1, \infty)$$



$$d) |x-4| < 3$$

$$x > 0$$

$$x-4 < 3$$

$$x < 7$$

$$x < 0$$

$$-x+4 < 3$$

$$-x < 3-4$$

$$-x < -1 \cdot (-1)$$

$$x > 1$$

$$(1, 7)$$

$$1 < x < 7$$

$$e) \frac{2x-3}{x+1} \leq 1$$

$$\frac{2x-3}{x+1} - 1 \leq 0$$

$$\frac{2x-3-x+1}{x+1} \leq 0$$

$$\frac{x-4}{x+1} \leq 0$$



$$\frac{x-4}{x+1} \leq 0$$

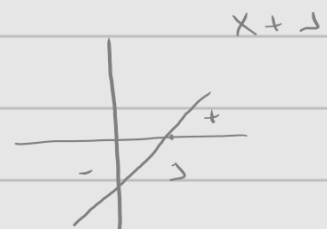
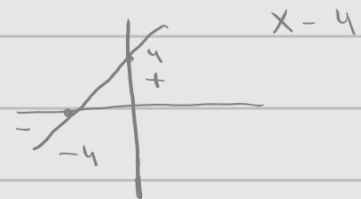
$$x-4 \leq 0$$

$$x \leq 4$$

$$x+1 \leq 0$$

$$x \leq -1$$

$$(-1, 4]$$



	$-1 < x$	$-1 < x < 4$	$4 < x$
$x-4$	-	-	+
$x+1$	-	+	+
$\frac{x-4}{x+1}$	+	-	+

30 -

$$b) \sqrt{ab} = \sqrt{a} \sqrt{b}$$

VERDADEIRO POR

PROPRIEDADES DA

RADICAÇÃO

$$1) \frac{a/x}{a/x - b/x} = \frac{a}{a-b}$$

$$\frac{\frac{a}{\cancel{x}} \cdot \cancel{x}}{\frac{a-b}{\cancel{x}} \cdot \cancel{x}} = \frac{a}{a-b}$$

VERDADEIRO