

1ª LISTA DE EXERCÍCIOS

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1. Calcule as expressões abaixo:

(a) $\frac{1}{2} + \frac{3}{2}$

(b) $\frac{6}{5} - \frac{2}{5}$

(c) $\frac{3}{4} + 1$

(d) $2 - \frac{2}{3}$

(e) $\frac{7}{3} - \frac{5}{7}$

(f) $\frac{4}{5} + \frac{5}{4}$

(g) $\frac{2}{3} - \frac{1}{2}$

(h) $\frac{2}{2} - \frac{3}{4}$

(i) $-\frac{1}{6} + \frac{3}{5}$

(j) $-\frac{5}{7} - \frac{5}{2}$

(k) $\frac{1}{2} + \frac{1}{3} + \frac{1}{5}$

(l) $\frac{2}{3} - \frac{1}{4} - \frac{1}{5}$

(a) $\frac{2}{\frac{3}{5}}$

(b) $\frac{9}{\frac{4}{4}}$

(c) $\frac{3}{\frac{2}{7}}$

(d) $\frac{8}{\frac{3}{4}}$

(e) $\frac{2}{\frac{5}{\frac{5}{6}}}$

(f) $\frac{1}{\frac{4}{\frac{1}{5}}}$

(g) $\frac{7}{\frac{8}{-\frac{2}{3}}}$

(h) $\frac{-\frac{5}{9}}{\frac{11}{2}}$

(i) $\frac{-\frac{2}{5}}{-\frac{1}{6}}$

(j) $-\frac{3}{\frac{7}{8}}$

(k) $\frac{1}{\frac{12}{\frac{1}{8} - \frac{1}{9}}}$

(l) $\frac{2}{\frac{2}{3}} - \frac{3}{2}$

(m) $\frac{1 - \frac{1}{3}}{2 - \frac{1}{3}}$

2. Efetue os produtos:

(a) $\frac{1}{2} \cdot \frac{1}{5}$

(b) $\frac{7}{4} \cdot \frac{5}{6}$

(c) $\frac{2}{3} \cdot \frac{1}{3}$

(d) $4 \cdot \frac{7}{19}$

(e) $\frac{8}{7} \cdot 5$

(f) $\frac{11}{2} \cdot \left(-\frac{5}{3}\right)$

(g) $\left(-\frac{3}{2}\right) \cdot \frac{9}{5}$

(h) $\left(-\frac{1}{6}\right) \left(-\frac{7}{3}\right)$

(i) $\frac{1}{6} \cdot \frac{2}{3} \cdot \frac{4}{5}$

5. Simplifique ao máximo as frações abaixo:

(a) $\frac{6}{12}$

(b) $\frac{15}{25}$

(c) $\frac{4}{24}$

(d) $\frac{35}{14}$

(e) $\frac{45}{63}$

(f) $\frac{75}{30}$

(g) $\frac{42}{105}$

(h) $\frac{0}{1250}$

(i) $\frac{-15}{5}$

(j) $\frac{15}{-5}$

(k) $\frac{-45}{-3}$

(l) $\frac{-3}{-45}$

(m) $\frac{-14}{21}$

(n) $\frac{512}{-64}$

(o) $\frac{-36}{-15}$

(p) $\frac{-40}{-24}$

3. Calcule as expressões

(a) $\frac{1}{3} \cdot \left(\frac{3}{5} + \frac{1}{2}\right)$

(b) $\frac{5}{2} \cdot \left(\frac{4}{3} - \frac{3}{4}\right)$

(c) $\left(3 + \frac{1}{4}\right) \left(1 - \frac{4}{5}\right)$

(d) $\left(\frac{1}{2} - \frac{1}{3}\right) \left(\frac{1}{2} + \frac{1}{3}\right)$

4. Calcule as expressões

6. Calcule o valor de:

- (a) 4^2 (h) 3^{-2}
 (b) $(-2)^5$ (i) $\left(\frac{4}{5}\right)^{-2}$
 (c) $(-5)^2$ (j) $\left(-\frac{1}{5}\right)^{-2}$
 (d) $\left(\frac{1}{2}\right)^2$ (k) $\left(-\frac{1}{2}\right)^{-3}$
 (e) -2^4 (l) $0,01^{-2}$
 (f) $\left(-\frac{2}{3}\right)^3$

7. Calcule o valor de cada expressão:

- (a) $\left(\frac{3}{4}\right)^4 \cdot (-4)^3 - (-2)^4$
 (b) $\left(-\frac{1}{5}\right)^2 \cdot 100 + (-3)^3 \cdot \left(-\frac{1}{9}\right)$
 (c) $\frac{(-5)^2 - 4 \cdot (-1)^7 - (-3)^0}{81 \cdot \left(-\frac{1}{3}\right)^3}$
 (d) $2 \cdot 5^{-2} - 5 \cdot 2^{-5}$
 (e) $60 \cdot \left(\frac{4}{3}\right)^{-2} - 12 \cdot \left(-\frac{2}{3}\right)^{-2}$

8. Simplifique

- (a) $\frac{7^2 \cdot (7^2)^3}{7^2}$
 (b) $\frac{5^6 \cdot 5^5 \cdot (5^3)^4}{(5^6)^3}$
 (c) $\frac{x^6 \cdot (y^2)^4}{x^4 \cdot y^{11}}, (x \cdot y \neq 0)$
 (d) $\frac{(x^2)^3 \cdot (x \cdot y)^4}{x^8 \cdot y}, (x \cdot y \neq 0)$
 (e) $\frac{(x^5)^4 \cdot (y^{-3})^4}{x^{-2} \cdot y}, (x \cdot y \neq 0)$

9. Escreva na forma de raiz

- (a) $7^{\frac{1}{2}}$ (d) $7^{\frac{2}{3}}$
 (b) $7^{\frac{1}{3}}$ (e) $7^{\frac{4}{5}}$
 (c) $7^{0,1}$ (f) $7^{\frac{9}{11}}$

10. Escreva na forma de expoente fracionário:

- (a) $\sqrt{11}$ (g) $\frac{1}{\sqrt{11}}$
 (b) $\sqrt[3]{11}$ (h) $\frac{1}{\sqrt[3]{11}}$
 (c) $\sqrt[5]{11}$ (i) $\frac{1}{\sqrt[5]{11^4}}$
 (d) $\sqrt[3]{11^2}$
 (e) $\sqrt[5]{11^3}$
 (f) $\sqrt[7]{11^4}$

11. Calcule o valor de:

- (a) $25^{\frac{1}{2}}$ (f) $8^{-\frac{2}{3}}$
 (b) $8^{\frac{1}{3}}$ (g) $16^{-\frac{3}{4}}$
 (c) $81^{\frac{1}{4}}$ (h) $0,36^{-0,5}$
 (d) $27^{\frac{2}{3}}$ (i) $0,0001^{-0,25}$
 (e) $16^{\frac{3}{2}}$

12. Transforme numa só potência as seguintes expressões:

- (a) $7^{\frac{1}{2}} \cdot 7^{\frac{1}{3}}$ (d) $\left(7^{\frac{2}{3}}\right)^{\frac{9}{4}}$
 (b) $7^{\frac{1}{4}} : 7^{\frac{1}{5}}$ (e) $5^{\frac{2}{3}} \cdot 7^{\frac{2}{3}}$
 (c) $\left(7^{\frac{1}{2}}\right)^{\frac{1}{3}}$ (f) $\frac{6^{\frac{4}{5}}}{7^{\frac{1}{5}}}$

13. Simplifique as expressões efetuando as operações indicadas.

- (a) $3a + 5b - 3c + 7b - 5c + 2a$
 (b) $6x^2 - 5y + 6x - 7y + 2x - 1 + x^2$
 (c) $ab + xy + 2ab - 3xy$
 (d) $(2x - 3) + 2x - (3x - 8)$
 (e) $(2x - 3) + (5x - 8) - (-7x + 8)$
 (f) $(x^2 - 2x + 3) - (-5x^2 + 2x - 8)$
 (g) $-2(x - 3y)$
 (h) $x^2(x + 2)$
 (i) $3x(x^2 + xy + y)$
 (j) $x^3(x - xy + x^2)$
 (k) $(x - 1)(x + 2)$
 (l) $(x^2 + 2)(2x - y)$
 (m) $(x + 1)(x + 2y - xy)$
 (n) $(x + y)(x^2 - xy + y - 3)$

14. Fatore colocando os fatores comuns em evidência e, quando possível, simplifique ainda mais, usando o agrupamento.

- (a) $2ax + 2ay$
- (b) $x^2 + x$
- (c) $x^3 + x^2$
- (d) $6x^3 + 4x^2 + 2x$
- (e) $x^2y + x^2 + x$
- (f) $x^2y^2 + xy^2$
- (g) $a(x + y) + b(x + y)$
- (h) $x(a - b) + y(a - b)$
- (i) $a^2 + ab + ac + bc$
- (j) $ax - bx + ay - by$

15. Desenvolva.

- (a) $(x + y)^2$
- (b) $(x + 1)^2$
- (c) $(x + h)^2$
- (d) $(x - 3)^2$
- (e) $3 \cdot (x - y)^2$
- (f) $(3x - 4)^2$
- (g) $-2 \cdot (3x + 1)^2$
- (h) $(x^2 - 3)^2$
- (i) $(x + y)(x - y)$
- (j) $(x + 2)(x - 2)$
- (k) $(4x - 5)(4x + 5)$
- (l) $(xy - 3)(xy + 3)$
- (m) $(y^2 - 10)(y^2 + 10)$
- (n) $(x + 2)^3$
- (o) $(x - 2)^3$
- (p) $(3x - 2)^3$

16. Fatore utilizando os produtos notáveis.

- (a) $x^2 + 2xy + y^2$
- (b) $x^2 - 2xy + y^2$
- (c) $x^2 + 6x + 9$
- (d) $x^2 - 10x + 25$
- (e) $x^2 + 2x + 1$
- (f) $2x^2 - 12x + 18$
- (g) $x^2 - 25$
- (h) $a^2 - 10.000$
- (i) $9x^2 - 4$

- (j) $4x^2 - 25y^2$
- (k) $x^3 + 6x^2 + 12x + 8$
- (l) $x^3 + 15x^2 + 75x + 125$
- (m) $x^3 - 9x^2 + 27x - 27$
- (n) $x^3 - 12x^2 + 48x - 64$

17. Resolva as equações em \mathbb{R} .

- (a) $2x + 6 = 8$
- (b) $-2x + 4 = 1$
- (c) $-3x = \frac{6}{5}$
- (d) $\frac{x}{3} - 2 = 0$
- (e) $-\frac{1}{3}x - \frac{4}{7} = 0$
- (f) $12 + x = 7 - 4x$
- (g) $\frac{3x + 9}{9} = \frac{x - 5}{6}$
- (h) $\frac{-3x + 6}{25} = \frac{2x + 8}{10}$
- (i) $0, 18x - 0, 90 = 0$
- (j) $(1 + 2x) - (2 - 3x) - (-2 + 4x) = 3$
- (k) $\frac{5x}{3} - \frac{1}{2} = \frac{3x}{2} - \frac{5}{6}$
- (l) $0, 21x + 3, 33 = 0, 12x + 6, 66$
- (m) $\frac{2x + 5}{4} + \frac{5x - 6}{3} = 2$
- (n) $\frac{3x + 1}{2} - \frac{x - 3}{3} = 2x$

18. Um tampão é aberto em uma caixa d'água e começa a esvaziá-la. A quantidade, Q , de água (em litros) remanescente na caixa após t minutos da abertura do tampão é $Q = 5.000 - 40t$. Quanto tempo se passou quando há exatos 2.300 litros de água na caixa?

19. A posição, s (em metros), de um móvel no decorrer tempo, t (em segundos), é dada por $S = 300 - 15t$. Qual é o tempo quando a posição é:

- (a) 120 metros?
- (b) -270 metros?

20. Resolva as equações em \mathbb{R} .

- (a) $x^2 - 9 = 0$
- (b) $x^2 - 3 = 0$

- (c) $2x^2 - 50 = 0$
- (d) $x^2 + 4 = 0$
- (e) $x^2 + x = 0$
- (f) $2t^2 - 10t = 0$
- (g) $-2x^2 + 7x = 0$
- (h) $x^2 + 6x - 16 = 0$
- (i) $x^2 + 3x - 18 = 0$
- (j) $m^2 - 10m + 21 = 0$
- (k) $2x^2 + 14x + 20 = 0$
- (l) $0,5x^2 + x - 7,5 = 0$
- (m) $-x^2 - 5x - 4 = 0$
- (n) $-2t^2 + 12t - 10 = 0$

21. A produção, P , depende da quantidade, q , de insumos utilizados. Em uma fábrica temos $P = 0,05q^2$, com P em toneladas e q em milhares de \$. Determine a quantidade de insumos necessários para que a produção seja de 80 toneladas.

22. Resolva as inequações em \mathbb{R} :

- (a) $4x - 12 > 0$
- (b) $2x + 16 \leq 0$
- (c) $-x - 3 \leq 5$
- (d) $-2x + 4 \geq 10$
- (e) $5 < -3x + 8$
- (f) $-12 > 2x - 4$
- (g) $12 + x \leq 3 - 2x$
- (h) $3x + 8 \geq 10 + 4x$
- (i) $4(x - 3) \leq -5(6 + x)$
- (j) $2(x+5) - (4-x) > 3(x-6) + 2(1-x)$
- (k) $\frac{x}{3} + \frac{x}{4} < -38 - x$
- (l) $\frac{x-1}{2} + \frac{2-x}{3} \geq \frac{3x-7}{6}$
- (m) $\frac{3(x-1)}{2} - \frac{2(1-x)}{3} \leq \frac{5(-x-1)}{4} - \frac{(x+1)}{6}$

Respostas

1. (a) 2 (g) $\frac{1}{6}$ (h) 0
 (b) $\frac{4}{5}$ (h) $-\frac{7}{20}$ (i) -3
 (c) $\frac{7}{4}$ (i) $\frac{13}{30}$ (j) -3
 (d) $\frac{4}{3}$ (j) $-\frac{45}{14}$ (k) 15
 (e) $\frac{34}{21}$ (k) $\frac{31}{30}$ (l) $\frac{1}{15}$
 (f) $\frac{41}{20}$ (l) $\frac{13}{60}$ (m) $-\frac{2}{3}$
 (n) -8
 (o) $\frac{12}{5}$
 (p) $\frac{5}{3}$
2. (a) $\frac{1}{10}$ (f) $-\frac{55}{6}$ (g) $\frac{1}{4}$
 (b) $\frac{35}{24}$ (g) $-\frac{27}{10}$ (h) $\frac{1}{9}$
 (c) $\frac{2}{9}$ (h) $\frac{7}{18}$ (i) $\frac{25}{16}$
 (d) $\frac{28}{19}$ (i) $\frac{8}{90}$ (j) 25
 (e) $\frac{40}{7}$ (j) $-\frac{8}{27}$ (k) -8
 (l) 10000
3. (a) $\frac{11}{30}$ (c) $\frac{13}{20}$ (a) 16
 (b) $\frac{35}{24}$ (d) $\frac{5}{36}$ (b) -32
 (c) $-\frac{145}{4}$ (e) $\frac{27}{4}$ (c) 25
 (d) 7
 (e) $-\frac{28}{3}$
 (f) $-\frac{61}{800}$
 (g) $\frac{27}{4}$
4. (a) $\frac{2}{15}$ (g) $-\frac{21}{16}$ (a) 7⁶
 (b) $\frac{9}{16}$ (h) $-\frac{10}{99}$ (b) 5⁵
 (c) $\frac{21}{2}$ (i) $\frac{12}{5}$ (c) $\frac{x^2}{y^3}$
 (d) $\frac{32}{3}$ (j) $-\frac{24}{35}$ (d) x^2y^3
 (e) $\frac{12}{25}$ (k) 6 (e) $\frac{x^{22}}{y^{13}}$
 (f) $\frac{5}{4}$ (l) $\frac{32}{12} = \frac{8}{3}$ (a) $\sqrt{7}$ (d) $\sqrt[3]{7^2}$
 (m) $\frac{2}{5}$ (b) $\sqrt[5]{7^4}$ (e) $\sqrt[5]{7^4}$
 (c) $\frac{10}{\sqrt{7}}$ (f) $\sqrt[11]{7^9}$

10. (a) $11^{\frac{1}{2}}$ (f) $11^{\frac{4}{7}}$ (i) $(a+b)(a+c)$
 (b) $11^{\frac{1}{3}}$ (g) $11^{-\frac{1}{2}}$ (j) $(a-b)(x+y)$
 (c) $11^{\frac{1}{5}}$ (h) $11^{-\frac{1}{3}}$ 15. (a) $x^2 + 2xy + y^2$
 (d) $11^{\frac{2}{3}}$ (i) $11^{-\frac{4}{5}}$ (b) $x^2 + 2x + 1$
 (e) $11^{\frac{3}{5}}$ (f) $x^2 + 2xh + h^2$
 11. (a) 5 (f) $\frac{1}{4}$ (d) $x^2 - 6x + 9$
 (b) 2 (g) $\frac{1}{8}$ (e) $3x^2 - 6xy + 3y^2$
 (c) 3 (h) $\frac{5}{3}$ (f) $9x^2 - 24x + 16$
 (d) 9 (i) 10 (g) $-18x^2 - 12x - 2$
 (e) 64 (j) $x^2 - y^2$
 12. (a) $7^{\frac{5}{6}}$ (e) $35^{\frac{2}{3}}$ (j) $x^2 - 4$
 (b) $7^{\frac{1}{20}}$ (f) $\left(\frac{6}{7}\right)^{\frac{4}{5}}$ (k) $16x^2 - 25$
 (c) $7^{\frac{1}{6}}$ (l) $x^2y^2 - 9$
 (d) $7^{\frac{3}{2}}$ (m) $y^4 - 100$
 13. (a) $5a + 12b - 8c$ (n) $x^3 + 6x^2 + 12x + 8$
 (b) $7x^2 + 8x - 12y - 1$ (o) $x^3 - 6x^2 + 12x - 8$
 (c) $3ab - 2xy$ (p) $27x^3 - 54x^2 + 36x - 8$
 (d) $x + 5$ 16. (a) $(x+y)^2$
 (e) $14x - 19$ (b) $(x-y)^2$
 (f) $6x^2 - 4x + 11$ (c) $(x+3)^2$
 (g) $-2x + 6y$ (d) $(x-5)^2$
 (h) $x^3 + 2x^2$ (e) $(x+1)^2$
 (i) $3x^3 + 3x^2y + 3xy$ (f) $2(x-3)^2$
 (j) $x^5 - x^4y + x^4$ (g) $(x-5)(x+5)$
 (k) $x^2 + x - 2$ (h) $(a-100)(a+100)$
 (l) $2x^3 - x^2y + 4x - 2y$ (i) $(3x-2)(3x+2)$
 (m) $-x^2y + x^2 + xy + x + 2y$ (j) $(2x-5y)(2x+5y)$
 (n) $x^3 - xy^2 + xy - 3x + y^2 - 3y$ (k) $(x+2)^3$
 14. (a) $2a(x+y)$ (l) $(x+5)^3$
 (b) $x(x+1)$ (m) $(x-3)^3$
 (c) $x^2(x+1)$ (n) $(x-4)^3$
 (d) $2x(3x^2 + 2x + 1)$ 17. (a) $x = 1$
 (e) $x(xy + x + 1)$ (b) $x = \frac{3}{2}$
 (f) $xy^2(x+1)$ (c) $x = -\frac{2}{5}$
 (g) $(a+b)(x+y)$ (d) $x = 6$
 (h) $(x+y)(a-b)$ (e) $x = -\frac{12}{7}$
 (f) $x = -1$

- (g) $x = -11$
(h) $x = -\frac{7}{4}$
(i) $x = 5$
(j) $x = 2$
(k) $x = -2$
(l) $x = 37$
(m) $x = \frac{33}{26}$
(n) $x = \frac{9}{5}$
18. $t = \frac{135}{2}$
19. (a) $t = 12$
(b) $t = 38$
20. (a) $x = \pm 3$
(b) $x = \pm\sqrt{3}$
(c) $x = \pm\sqrt{5}$
(d) \emptyset
(e) $x = 0$ ou $x = 1$
(f) $t = 0$ ou $t = 5$
(g) $x = 0$ ou $x = \frac{7}{2}$
(h) $x = -8$ ou $x = 2$
- (i) $x = -6$ ou $x = 3$
(j) $m = 3$ ou $m = 7$
(k) $x = -5$ ou $x = -2$
(l) $x = -5$ ou $x = 3$
(m) $x = -4$ ou $x = -1$
(n) $t = 1$ ou $t = 5$
21. 40 milhares
22. (a) $x > 3$
(b) $x \leq -8$
(c) $x \geq -8$
(d) $x \leq -3$
(e) $x < 1$
(f) $x < -4$
(g) $x \leq -3$
(h) $x \leq -2$
(i) $x \leq -2$
(j) $x > -11$
(k) $x < -24$
(l) $x \leq 4$
(m) $x < \frac{9}{43}$