

Lista de exercícios 1

1. Complete com $\subset$, $\not\subset$, $\in$ ou $\notin$.

a) $\mathbb{N}$ _____ $\mathbb{Z}$

b) π _____ $\mathbb{Q}$

c) $\mathbb{R} \setminus \mathbb{Q}$ _____ $\mathbb{Z}$

d) $\frac{5}{2}$ _____ $\mathbb{Q}$

e) $\mathbb{N}^*$ _____ $\mathbb{R}$

f) $\frac{48}{6}$ _____ $\mathbb{N}$

2. Simplifique as expressões a seguir removendo fatores do integrando:

a) $\sqrt{288}$

b) $\sqrt[3]{500}$

c) $\sqrt[3]{8x^6y^4}$

3. Racionalize o denominador:

a) $\frac{4}{\sqrt[3]{2}}$

b) $\frac{1}{\sqrt{5}}$

c) $\frac{1}{\sqrt[5]{x^2}}$

d) $\sqrt[5]{\frac{a^3}{b^2}}$

4. Coverta as expressões para a forma exponencial:

a) $\sqrt[3]{(a+2b)^2}$

b) $\sqrt[5]{x^2y^3}$

c) $xy^4\sqrt{xy^3}$

5. Simplifique as expressões exponenciais:

a) $\frac{a^{\frac{3}{5}}a^{\frac{1}{3}}}{a^{\frac{3}{2}}}$

b) $(x^2y^4)^{\frac{1}{2}}$

c) $\left(\frac{-8x^6}{y^{-3}}\right)^{\frac{2}{3}}$

6. Simplifique as expressões radicais:

a) $\sqrt{9x^{-6}y^4}$

b) $\sqrt[5]{\frac{4x^6y}{9x^3}}$

c) $\sqrt{18x^2y} + \sqrt{2y^3}$

d) $\sqrt[3]{\frac{4x^2}{y^2}}\sqrt[3]{\frac{2x^2}{y}}$

7. Fatore as expressões colocando o fator comum em evidência:

a) $5x - 15$

b) $5x^3 - 20x$

c) $yz^3 - 3yz^2 + 2yz$

8. Fatore usando os produtos notáveis:

a) $z^2 - 49$

b) $16 - (x + 2)^2$

c) $36y^2 + 12y + 1$

d) $y^3 - 8$

e) $z^3 + 64$

f) $2x^2 - 3xy + y^2$

9. Fatore completamente:

a) $x^3 + x$

b) $4x^3 - 20y^2 + 25y$

c) $2x^3 - 16x^2 + 14x$

10. Simplifique as expressões:

a) $\frac{18x^3}{x}$

b) $\frac{75y^2}{9y^4}$

c) $\frac{x^3}{x^2-2x}$

- d) $\frac{y^3+4y^2-21y}{y^2-49}$
e) $\frac{3}{x-2} + \frac{x+1}{x-2}$
f) $\frac{3}{x^2+3x} - \frac{1}{x} - \frac{6}{x^2-9}$
g) $\frac{x+3}{x-1} \frac{1-x}{x^2-9}$
h) $\frac{4x}{y} \div \frac{8y}{x}$

Gabarito

1. (a) $\mathbb{N} \subset \mathbb{Z}$
(b) $\pi \notin \mathbb{Q}$
(c) $\mathbb{R} \setminus \mathbb{Q} \not\subset \mathbb{Z}$
(d) $\frac{5}{2} \in \mathbb{Q}$
(e) $\mathbb{N}^* \subset \mathbb{R}$
(f) $\frac{48}{6} = 8 \in \mathbb{N}$
2. (a) $\sqrt{288} = 12\sqrt{2}$
(b) $\sqrt{500} = 10\sqrt{5}$
(c) $\sqrt[3]{8x^6y^4} = 2x^2\sqrt[3]{y}$
3. (a) $\frac{4}{\sqrt[3]{2}} = 2\sqrt[3]{4}$
(b) $\frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$
(c) $\frac{1}{\sqrt[5]{x^2}} = \frac{\sqrt[5]{x^3}}{x}$
(d) $\sqrt[5]{\frac{a^3}{b^2}} = \frac{\sqrt[5]{a^3b^3}}{b}$
4. (a) $\sqrt[3]{(a+2b)^2} = (a+2b)^{\frac{2}{3}}$
(b) $\sqrt[5]{x^2y^3} = x^{\frac{2}{5}}y^{\frac{3}{5}}$

- (c) $xy\sqrt[4]{xy^3} = x^{\frac{5}{4}}y^{\frac{7}{4}}$
5. (a) $\frac{a^{\frac{1}{2}}a^{\frac{3}{4}}}{a^{\frac{5}{8}}} = a^{\frac{5}{8}}$
- (b) $(x^2y^4)^{\frac{1}{2}} = xy^2$
- (c) $\left(\frac{-8x^6}{y^{-3}}\right)^{\frac{2}{3}} = 4x^4y^2$
6. (a) $\sqrt{9x^{-6}y^4} = 3x^{-3}y^2 = \frac{3y^2}{x^3}$
- (b) $\sqrt[5]{\frac{4x^6y}{9x^3}} = \sqrt[5]{\frac{4x^3y}{9}}$
- (c) $\sqrt{18x^2y} + \sqrt{2y^3} = (3x + y)\sqrt{2y}$
- (d) $\sqrt[3]{\frac{4x^2}{y^2}}\sqrt[3]{\frac{2x^2}{y}} = \sqrt[3]{\frac{8x^4}{y^3}} = \frac{2x}{y}\sqrt[3]{x}$
7. (a) $5x - 15 = 5(x - 3)$
- (b) $5x^2 - 20x = 5x(x - 4)$
- (c) $yz^3 - 3yz^2 + 2yz = yz(z^2 - 3z + 2) = yz(z - 1)(z - 2)$
8. (a) $z^2 - 49 = (z - 7)(z + 7)$
- (b) $16 - (x + 2)^2 = (2 - x)(x + 6)$
- (c) $36y^2 + 12y + 1 = (6y + 1)^2$
- (d) $a^3 - 8 = (a - 2)(a^2 + 2a + 4)$
- (e) $z^3 + 64 = (z + 4)(z^2 - 4z + 16)$
- (f) $2x^2 - 3xy + y^2 = (2x - y)(x - y)$
9. (a) $x^3 + x = x(x^2 + 1)$
- (b) $2x^3 - 16x^2 + 14x = 2x(x^2 - 8x + 7) = 2x(x - 1)(x - 7)$
10. (a) $\frac{18x^3}{x} = 18x^2$
- (b) $\frac{75y^2}{9y^4} = \frac{25}{3y^2}$

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

$$(d) \frac{y^3 + 4y^2 - 21y}{y^4 - 49} = \frac{y(y + 7)(y - 3)}{(y^2 - 7)(y^2 + 7)}$$

$$(e) \frac{3}{x - 2} + \frac{x + 1}{x - 2} = \frac{x + 4}{x - 2}$$

$$(f) \frac{2}{x^2 + 3x} - \frac{1}{x} - \frac{6}{x^2 - 9} = \frac{-x^2 - 4x + 3}{x(x^2 - 9)}$$

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

$$(h) \frac{4x}{y} \div \frac{8y}{x} = \frac{x^2}{2y^2}$$