

**IV** Treinamento Intensivo de  
Fundamentos Matemáticos  
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Coordenação de Monitoria

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## 0.1 Número Inteiros ( $\mathbb{Z}$ )

1. Efetuar as operações. Represente na reta os números em cada uma das etapas:

- (a)  $10-9-7-8+12-3-7+8-31+7+20$  **R:-8**  
 (b)  $-22-6+8+12+10-45-27+33$  **R:-37**  
 (c)  $12-(10-9-8-4)+15$  **R:38**  
 (d)  $-23-10-[9-17+(8-9-7)-1]$  **R:-50**  
 (e)  $16+23-12-[8+4+7-(5-3-9)+13]+12$  **R: 0**  
 (f)  $34+12-10-8-9-[21-9-8-(23-9-10)]$  **R:37**  
 (g)  $90-[11-7-(5+14-34)-14-8]$  **R:93**  
 (h)  $45-87-12-12-56-10-[12-24-45+(45-32-54)+9+18]$  **R:-61**

2. Calcule as expressões:

- (a)  $7-(10+5)+5\cdot(7-3)$  **R.: 12**  
 (b)  $4+5\cdot 8-3\cdot 11+5$  **R.: 16**  
 (c)  $-8+5\cdot(-1+3)-7$  **R.: -5**  
 (d)  $2-(-2-5)-2\cdot(-5+2)$  **R.: 15**  
 (e)  $-3\cdot-3-2\cdot[-5-3\cdot(-1+3)]-5-7$  **R.: -49**  
 (f)  $-5-2\cdot-3-2\cdot[-4-2(-6+10)\cdot(-3+1)]+7$  **R.: 35**  
 (g)  $(-1+5)\cdot(5-1)-2\cdot[-3+2\cdot(3+2\cdot 6)-4]$  **R.: -30**  
 (h)  $7-6-(-17-6)+3\cdot[3+4\cdot(-2+3\cdot 2)-4]$  **R.: 51**  
 (i)  $4+3\cdot 2-6\cdot 7+3\cdot 5+4\cdot(-2)-8\cdot 2+11$  **R.: -30**

3. Calcule as expressões

- (a)  $7-((10+5)+(5\cdot(7-3))^3)2$   
 (b)  $4+(5\cdot 8-3\cdot 11)^2+5$   
 (c)  $-8+5\cdot((-1+3)-7)^4$   
 (d)  $2-((-2-5)-2\cdot(-5+2))^3$   
 (e)  $-3\cdot\{-3-2\cdot[-5-3\cdot(-1+3)]\}^3-(5-7)$   
 (f)  $-5-2\cdot\{-3-2\cdot[-4-2(-6+10)\cdot(-3+1)]+7\}^2$   
 (g)  $\sqrt{(-1+5)}\cdot(5-1)^2-2\cdot[-3+2\cdot(3+2\cdot 6)-4]$   
 (h)  $7-6-(-17-6)+3\cdot[3+(4\cdot(-2+3\cdot 2))^3-4]$   
 (i)  $4+(3\cdot 2-6\cdot 7)^2+3\cdot 5+4\cdot(-2)-8\cdot 2+11)^3$

4. Decomponha em números primos

(a) 147

(b) 525

(c) 504

(d) 187

(e) 1155

(f) 3969

(g) 2310

(h) 1008

(i) 756

(j) 5040

## 0.2 Números Racionais Q

5. Simplificar as seguintes frações:

(a)  $\frac{25}{10}$

(b)  $\frac{12}{36}$

(c)  $\frac{72}{144}$

(d)  $\frac{21}{3}$

(e)  $\frac{-16}{128}$

(f)  $\frac{75}{-15}$

(g)  $\frac{-8}{-480}$

(h)  $\frac{32}{512}$

(i)  $\frac{27}{243}$

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

(k)  $\frac{9}{11}$

6. Reduzir ao mesmo denominador comum:

(a)  $\frac{1}{2}, \frac{1}{3}, \frac{5}{6}, \frac{7}{12}$

(b)  $\frac{4}{2}, \frac{1}{5}, \frac{3}{2}, \frac{5}{3}, \frac{7}{6}$

(c)  $3, \frac{5}{4}, \frac{1}{2}, \frac{1}{9}$

(d)  $\frac{4}{3}, \frac{11}{5}, \frac{5}{7}$

(e)  $\frac{2}{3}, \frac{1}{5}, \frac{3}{7}$

(f)  $\frac{2}{3}, \frac{2}{5}, \frac{2}{7}$

(g)  $\frac{3}{11}, \frac{2}{13}, \frac{5}{26}$

(h)  $\frac{3}{7}, \frac{5}{4}, \frac{7}{11}$

7. Refaça o exercício 6 colocando as frações em ordem crescente

8. Efetuar

(a)  $\frac{2}{7} + \frac{2}{3}$

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

(c)  $\frac{7}{2} + \frac{4}{4}$

(d)  $\frac{-1}{5} + \frac{8}{3} + \frac{-3}{4}$

(e)  $\frac{5}{6} + \frac{3}{4} - 4$

(f)  $\frac{4}{9} - \frac{7}{12} + 3$

(g)  $\frac{2}{14} + \frac{4}{21}$

(h)  $\frac{-7}{10} + \frac{4}{15}$

(i)  $\frac{9}{7} + \frac{4}{9}$

(j)  $\frac{3}{5} + \frac{11}{7}$

(k)  $\frac{2}{9} + \frac{3}{8}$

(l)  $\frac{4}{7} + \frac{-7}{11}$

$$(m) \frac{2}{7} + \frac{2}{3} - \frac{2}{5} + \frac{-1}{3}$$

$$(n) \frac{7}{2} + \frac{4}{4} + \frac{-1}{5} + \frac{8}{3} + \frac{-3}{4}$$

$$(o) \frac{5}{6} + \frac{3}{4} - 4 - \frac{4}{9} - \frac{7}{12}$$

$$(p) \frac{2}{14} - \frac{4}{21} - \frac{-7}{10} + \frac{4}{15}$$

## 9. Efetuar

$$(a) \frac{2}{7} \times \frac{2}{3}$$

$$(b) \frac{2}{5} \times \frac{-1}{3}$$

$$(c) \frac{7}{2} : \frac{4}{4}$$

$$(d) \frac{-1}{5} : \frac{8}{3} + \frac{-3}{4}$$

$$(e) \frac{5}{6} \times \frac{3}{4}$$

$$(f) \frac{4}{9} : \frac{7}{12}$$

$$(g) \frac{2}{14} \times \frac{4}{21}$$

$$(h) \frac{-7}{10} : \frac{4}{15}$$

$$(i) \frac{9}{7} : \frac{4}{9}$$

$$(j) \frac{3}{5} \times \frac{11}{7}$$

$$(k) \frac{2}{9} \times \frac{3}{8}$$

$$(l) \frac{4}{7} : \frac{-7}{11}$$

$$(m) \frac{2}{7} \times \frac{2}{3} \times \frac{2}{5} \times \frac{-1}{3}$$

$$(n) \left(\frac{7}{2} : \frac{4}{4}\right) \times \left(\frac{-1}{5} : \frac{8}{3}\right) + \frac{3}{4}$$

$$(o) \left(\frac{5}{6} \times \frac{3}{4}\right) : \left(\frac{4}{9} : \frac{7}{12}\right)$$

$$(p) \frac{2}{14} - \left(\left(\frac{4}{21} \times \frac{-7}{10}\right) : \frac{4}{15}\right)$$

$$(q) \left(\frac{7}{2} : \frac{4}{4}\right) \times \left(\frac{-1}{5} : \frac{8}{3}\right) + \frac{3}{4}$$

$$(r) \left(\frac{5}{6} \times \frac{3}{4}\right) : \left(\frac{4}{9} : \frac{7}{12}\right)$$

$$(s) \frac{2}{14} - \left(\left(\frac{4}{21} \times \frac{-7}{10}\right) : \frac{4}{15}\right)$$

$$(t) \left(\frac{3}{5} + \frac{1}{5}\right) \times \frac{2}{7} \times \frac{2}{3}$$

$$(u) \frac{2}{6} \left(\frac{2}{5} + \frac{-1}{3}\right) - \frac{5}{6}$$

$$(v) \frac{2}{11} - \frac{3}{22} \cdot \left(\frac{7}{2} + \frac{4}{4}\right)$$

$$(w) \frac{5}{7} - \frac{1}{42} \times \left(\frac{-1}{5} + \frac{8}{3} : \frac{-3}{4}\right)$$

$$(x) \left(\frac{1}{5} - \frac{5}{6}\right) : \left(\frac{4}{15} + \frac{5}{3}\right)$$

$$(y) \frac{3}{4} - \frac{7}{15} - \frac{3}{3} + \frac{11}{6}$$

$$(z) \frac{25}{10} + \left(\frac{2}{5} + \frac{-1}{3} - \frac{5}{6}\right) : \frac{12}{36} - \frac{72}{144}$$

## 10. Efetuar as operações:

$$(a) \frac{3}{5} + \frac{1}{5}$$

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

$$(c) \frac{2}{11} - \frac{3}{22}$$

$$(d) \frac{5}{7} - \frac{1}{42}$$

$$(e) \frac{1}{5} - \frac{5}{6} - \frac{4}{15} + \frac{5}{3}$$

$$(f) \frac{3}{4} - \frac{7}{15} - \frac{3}{3} + \frac{11}{6}$$

$$(g) \frac{25}{10} : \frac{12}{36} - \frac{72}{144}$$

$$(h) \frac{21}{3} : \left(1 + \frac{-16}{128}\right)$$

$$(i) \left(\frac{75}{-15} + 1\right) : \frac{-8}{-480}$$

$$(j) \frac{32}{512} - \left(2 - \frac{27}{243} \times \frac{15}{25}\right)$$

$$(k) \left(\frac{9}{11} : \frac{13}{36}\right) \times \left(\frac{5}{6} + \frac{1}{2}\right)$$

$$(l) \left(\frac{1}{2} - \frac{1}{3}\right) : \left(\frac{5}{6} - \frac{7}{12}\right)$$

$$(m) \left(\frac{4}{2} + \frac{1}{5} \times \frac{3}{2}\right) : \left(\frac{5}{3} - \frac{7}{6}\right)$$

$$(n) \left(3 + \frac{5}{4}\right) \times \frac{1}{2} - \frac{1}{9}$$

$$(o) \left(\frac{4}{3} \times \frac{11}{5}\right) : \frac{5}{7}$$

$$(p) \frac{2}{3} + \frac{1}{5} - \frac{3}{7}$$

$$\begin{aligned} \text{(q)} \quad & -\frac{2}{3} + \frac{2}{5} \times \frac{2}{7} \\ \text{(r)} \quad & \frac{3}{11} : \frac{2}{13} - \frac{5}{26} \\ \text{(s)} \quad & \frac{3}{7} : \frac{5}{4} - \frac{7}{11} \\ \text{(t)} \quad & \frac{2}{14} \times \frac{4}{21} \\ \text{(u)} \quad & \frac{-7}{10} : \frac{4}{15} \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad & \frac{9}{7} : \frac{4}{9} \\ \text{(w)} \quad & \frac{3}{5} \times \frac{11}{7} \\ \text{(x)} \quad & \frac{2}{9} \times \frac{3}{8} \\ \text{(y)} \quad & \frac{4}{7} : \frac{-7}{11} \\ \text{(z)} \quad & \frac{2}{7} \times \frac{2}{3} \times \frac{2}{5} \times \frac{-1}{3} \end{aligned}$$

### 0.3 Potenciação

11. Calcule as potências:

$$\begin{aligned} \text{(a)} \quad & (-6)^2 & \text{(k)} \quad & (-1)^{20} & \text{(s)} \quad & \left(-\frac{2}{7}\right)^3 \\ \text{(b)} \quad & -(-6)^2 & \text{(l)} \quad & (-1)^{17} & \text{(t)} \quad & \left(\frac{2}{3}\right)^2 \\ \text{(c)} \quad & -6^2 & \text{(m)} \quad & ((2^3)^3)^3 & \text{(u)} \quad & \left(\frac{-4}{3}\right)^3 \\ \text{(d)} \quad & (-2)^3 & \text{(n)} \quad & ((4^3 - 1)^3 - 2^4)^3 & \text{(v)} \quad & \left(-\frac{3}{4}\right)^3 + \left(-\frac{2}{7}\right)^3 \\ \text{(e)} \quad & -2^3 & \text{(o)} \quad & \left(\frac{2}{3}\right)^2 & \text{(w)} \quad & \left(\frac{2}{3}\right)^2 - \left(\frac{-4}{3}\right)^3 \\ \text{(f)} \quad & 5^0 & \text{(p)} \quad & \left(\frac{-4}{3}\right)^3 & \text{(x)} \quad & \left(\frac{-4}{3}\right)^3 + \left(\frac{1}{4}\right)^3 \\ \text{(g)} \quad & (-8)^0 & \text{(q)} \quad & \left(\frac{517}{643}\right)^0 & & \\ \text{(h)} \quad & 0^{28} & \text{(r)} \quad & \left(-\frac{3}{5}\right)^2 & & \\ \text{(i)} \quad & 1^{32} & & & & \\ \text{(j)} \quad & 13^2 & & & & \end{aligned}$$

12. Calcule o valor de

$$\begin{aligned} \text{(a)} \quad & [4^7 \cdot 4^{10} \cdot 4]^2 \div (4^5)^7 & \text{(c)} \quad & \frac{x^3 \cdot y^5 \cdot x^{-1} \cdot y^3 \cdot (x^3)^2}{\cdot y^{-2} \cdot x^4 \cdot (x^2)^4} \\ \text{(b)} \quad & (a \cdot b)^3 \cdot b \cdot (b \cdot c)^2 & \text{(d)} \quad & \frac{(z^3 \cdot w^3 + z^{-1})}{w^{-2} \cdot (z^4 + (z^2)^4)} \cdot \frac{w^3 + z^{-2}}{w^{-1} + \frac{1}{z^3}} \end{aligned}$$

13. Dado  $a = 2^7 \cdot 3^8 \cdot 7^2$   $b = 2^5 \cdot 3^6 \cdot 7^0$  calcule

$$\begin{aligned} \text{(a)} \quad & \frac{a}{b} & \text{(e)} \quad & a^2 \cdot \frac{a}{b^3} \\ \text{(b)} \quad & a^3 \cdot b^2 & \text{(f)} \quad & (a^2 + 1)(b^2 - 1) \\ \text{(c)} \quad & \frac{a}{b^2} & \text{(g)} \quad & a(a + b) - b(b - a) \\ \text{(d)} \quad & \frac{a^3}{b} & \text{(h)} \quad & \frac{a^2 - 49}{b^2 + 25} \end{aligned}$$

14. Simplifique a expressão

$$(a) \frac{3 \cdot \left(\frac{1}{2}\right)^2 + \frac{1}{4}}{3 \cdot \left(-\frac{1}{3}\right)^2 - \frac{3}{2}}$$

$$(b) \frac{2^3 \cdot \left(\frac{2}{3}\right)^3 + \frac{1}{4} \cdot \frac{2}{3}}{3 \cdot \left(-\frac{1}{3}\right)^2 - \left(\frac{3}{2} - 1\right)^2}$$

$$(c) \frac{\left(\frac{1}{3} - 1\right)^2 \cdot \left(\frac{2}{3}\right)^3 - \frac{2}{4} \cdot \frac{2}{3}}{2 - \left(-\frac{1}{3}\right)^2 - \left(3^2 + \frac{3}{2}\right)^3}$$

$$(d) \frac{\left[\left(\frac{1}{3} - 1\right)^2 \cdot \left(\frac{2}{3}\right)^3 - \frac{2}{4}\right] \cdot \frac{2}{3}}{2 - \left(-\frac{1}{3}\right)^2 - \left(3^2 + \frac{3}{2}\right)^3}$$

$$(e) \frac{\left[3 \cdot \left(\frac{1}{2}\right)^2 + 1\right]^2 - \frac{1}{4}}{\left[3 \cdot \left(-\frac{1}{3}\right)\right]^2 - \frac{3}{2}}$$

$$(f) \frac{\left[3 \cdot \left(\frac{1}{2}\right)^2 + 1\right]^2 - \frac{1}{4}}{\left[3 \cdot \left(-\frac{1}{3}\right) - \left(-\frac{2}{3}\right)^3\right]^2 - \frac{3}{2}}$$

15. Calcule o valor numérico da expressão  $a^2 - 2ab + b^2$  para

$$(a) a = \frac{1}{3} \text{ e } b = \frac{3}{5}$$

$$(b) a = \frac{-2}{7} \text{ e } b = -\frac{3}{2}$$

$$(c) a = \frac{3}{5} \text{ e } b = \frac{5}{7}$$

$$(d) a = \left(\frac{1}{3} - 1\right)^2 \text{ e } b = \left(1 - \frac{3}{5}\right)$$

$$(e) a = \left(\frac{1}{3} - \frac{4}{5}\right)^2 \text{ e } b = \left(\frac{1}{3} - \frac{3}{5}\right)$$

$$(f) a = \left(\frac{1}{3} + 1\right)^2 \text{ e } b = \left(\frac{1}{3} - \frac{3}{5}\right) : \frac{4}{5}$$

16. Escreva a forma decimal de representar as seguintes potências:

$$(a) 2^{-3}$$

$$(b) 10^{-2}$$

$$(c) 4^{-1}$$

$$(d) \left(\frac{1}{3} + \frac{3}{5}\right)^3$$

17. Efetue

$$(a) \left(\frac{2a^2b}{c^3}\right)^2 \cdot \left(\frac{a^2c}{b}\right)^3$$

$$(b) \left(\frac{2a^2b}{c^3} - \frac{a^2}{b^2}\right)^2 \cdot \left(\frac{a^2c}{b} - \frac{c^2}{a^3b^2}\right)^3$$

$$(c) \frac{\left(\frac{3x^2y}{a^3b^3}\right)^2}{\left(\frac{3xy^2}{2a^2b^2}\right)^3}$$

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

$$(e) \left(\frac{2a^2b}{c^3} - \frac{c^5b}{a^2}\right)^2 \cdot \frac{a^2}{b^2}$$

$$(f) \frac{\left(\frac{3x^2y}{a^3b^3}\right)^2}{\left(\frac{3x^2y}{x^3y^2}\right)^{-2}}$$

$$(g) \left(\frac{2a^2b}{c^3} + \left(\frac{a^2c}{b}\right)^3\right)^2 : \left(\frac{a^2c}{b} - \frac{c^2}{a^3b^2}\right)^2$$

$$(h) \frac{\left(\frac{3xy^2}{2a^2b^2}\right)^3}{\left(\frac{3x^2y^2}{x^3b^{-2}}\right)^3}$$

$$(i) \frac{x^{-1} + y^{-1}}{(xy)^{-1}}$$

$$(j) \frac{x^{-1} + y^{-1}}{(x + y)^{-1}}$$

$$(k) \left(\frac{x^{-1} + y^{-1}}{(x - y)}\right)^2$$

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

$$(m) \left[\left(\frac{a - 1}{b}\right)^{-1}\right]^{-2}$$

18. Dado  $a = \frac{1}{4}$ ,  $b = \frac{-2}{3}$ ,  $c = \frac{-1}{3^2}$ ,  $x = \frac{-3}{7}$ ,  $y = \frac{5}{7}$ . Calcule o valor numérico de cada item do exercício 17

## 0.4 Radiciação

19. Calcule

(a)  $\sqrt{36} =$

(b)  $\sqrt{121} =$

(c)  $\sqrt{269} =$

(d)  $\sqrt{625} =$

(e)  $\sqrt[3]{125} =$

(f)  $\sqrt[3]{243} =$

(g)  $\sqrt[5]{1} =$

(h)  $\sqrt[6]{0} =$

(i)  $\sqrt[3]{-125} =$

(j)  $\sqrt[7]{-1} =$

(k)  $\sqrt[5]{-32} =$

20. Fatore e escreva na forma de potência com expoente fracionário:

(a)  $\sqrt[3]{32} =$

(b)  $\sqrt[3]{25} =$

(c)  $\sqrt[4]{27} =$

(d)  $\sqrt[4]{125} =$

(e)  $\sqrt[7]{8} =$

(f)  $\sqrt[7]{81} =$

(g)  $\sqrt[8]{512} =$

(h)  $\sqrt[3]{4116} =$

21. Calcule a raiz indicada:

(a)  $\sqrt{4a^2} =$

(b)  $\sqrt{36a^2b^6} =$

(c)  $\sqrt{\frac{4}{9}a^8b^4} =$

(d)  $\sqrt{\frac{a^24}{100}} =$

(e)  $\sqrt{\frac{16a^{10}}{25}} =$

(f)  $\sqrt{\frac{1}{625}} =$

(g)  $\sqrt{\frac{16a^4}{49b^2c^6}} =$

(h)  $\sqrt[3]{a^3b^6} =$

(i)  $\sqrt{\sqrt[5]{16^2}\sqrt[5]{(33-1)^6}} =$

(j)  $\sqrt{\sqrt[5]{x^2}\sqrt[5]{(x-1)^6}} =$

22. De o valor das expressões na forma fracionária:

(a)  $\sqrt{\frac{1}{100}} =$

(b)  $-\sqrt{\frac{1}{16}} =$

(c)  $\sqrt{\frac{4}{9}} =$

(d)  $\frac{4}{3}\sqrt{\frac{81}{16}} =$

(e)  $1 + \sqrt{\frac{25}{16}} =$

(f)  $\frac{\sqrt{49}}{3} - \sqrt{\frac{81}{16}} =$

(g)  $\frac{\frac{\sqrt{49}}{3}}{\frac{\sqrt[4]{81}}{3} - \sqrt{\frac{81}{16}}} =$

(h)  $\sqrt[2]{1 + \sqrt{\frac{25}{16}}} - \sqrt[3]{\frac{\sqrt{27}}{3} - \sqrt{\frac{125}{81}}} =$

23. Calcule os valores das seguintes expressões:

(a)  $\sqrt{81}$

(b)  $\sqrt[3]{125}$

(c)  $\sqrt{3} \cdot \sqrt{3}$

(d)  $\sqrt[3]{9} \cdot \sqrt[3]{81}$

(e)  $\frac{2^{\frac{1}{2}} \cdot \sqrt{3}}{\sqrt{216}}$

(f)  $\frac{\sqrt{3+\sqrt{3}}}{2} \cdot \frac{\sqrt{2}}{\sqrt{6}}$

(g)  $\frac{\sqrt{\sqrt[3]{\sqrt[3]{81} \cdot \sqrt[3]{81^2}}}}{3^{-\frac{1}{3}}}$

(h)  $\frac{\sqrt[6]{6^4 \cdot 6^{\frac{1}{2}}}}{\sqrt[6]{6}}$

(i)  $\sqrt[1543]{1}$

(j)  $\sqrt[22]{-1}$

(k)  $\sqrt[27]{-1}$

(l)  $\sqrt[3]{-16} \cdot \sqrt{64}$

(m)  $\sqrt[5]{179^5} + \sqrt[3]{-189^3} - \sqrt[7]{(-10)^7}$

(n)  $\frac{\sqrt{\sqrt{\sqrt{3}}}}{\sqrt[8]{3}} - 4$

(o)  $\sqrt[142]{0}$

(p)  $\frac{\sqrt[3]{16} \cdot \sqrt{6} \cdot \sqrt[3]{4} \cdot \sqrt{\sqrt[3]{2 \cdot (2+\sqrt{4})}}}{\sqrt{3}}$

(q)  $\sqrt{(-3)^2}$

(r)  $\sqrt[4]{(-4)^4}$

(s)  $\sqrt[3]{(-5)^3} + (\sqrt[3]{5})^3$

## 24. Simplifique

(a)  $12\sqrt{10} - \sqrt{10} + 8\sqrt{10}$

(b)  $6\sqrt{12} - 4\sqrt{12} - 8\sqrt{12}$

(c)  $-4\sqrt[3]{11} + 5\sqrt[3]{11} - 11\sqrt[3]{11}$

(d)  $-\sqrt[4]{81} + 23\sqrt[4]{81} - 11\sqrt[4]{81}$

(e)  $-4\sqrt[3]{79} \cdot (5\sqrt[3]{79} - 11\sqrt[3]{79})$

(f)  $\sqrt{6} \cdot (\sqrt{10} - 8\sqrt{10})$

(g)  $(2\sqrt{11} - 3\sqrt{11}) \cdot (\sqrt{10} - 8\sqrt{10})$

(h)  $\frac{\sqrt{2} - 4\sqrt{2}}{-5\sqrt{2} + 8\sqrt{2}}$

(i)  $-4\sqrt[3]{79} \cdot (5\sqrt[3]{79} - 11\sqrt[3]{79})$

(j)  $\frac{\frac{1}{3}\sqrt[3]{11} - \frac{5}{2}\sqrt[3]{11} + 1\sqrt[3]{11}}{\frac{1}{3}\sqrt[4]{81} \left(1 - \frac{7}{4}\right)^2 + \sqrt[4]{81} \cdot \left(5 - \frac{1}{3}\sqrt[4]{81}\right)^2}$

## 25. Calcule

(a)  $\left(1 - \frac{1}{2}\right)^2$

(b)  $\sqrt{\left(1 - \frac{1}{2}\right)^2 + 1}$

(c)  $\sqrt{\left(1 - \frac{1}{2}\right)^2 + 1}$

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

(e)  $\left(\sqrt{\left(1 - \frac{1}{2}\right)^2 + \frac{2}{3} + \frac{3}{4}}\right)^3$

(f)  $\left(1 - \frac{3}{4}\right)\left(3 + \frac{2}{5}\right)$

## 0.5 Produtos Notáveis

## 26. Desenvolva

(a)  $(5 + b)^3$

(b)  $(3a - b)^2$

(c)  $(3a^2 + 2)^3$

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



- (e)  $(2b - 3a)^3$
- (f)  $(b - a)^3 \cdot (b - a)^2$
- (g)  $(b + a)^2 \cdot (b - a)^2$
- (h)  $(b^2 - a^3)^3 \cdot (b - a)^2$
- (i)  $((b + 1)^2 - a^3)^2 \cdot (b^2 - 3a^4)^2$
- (j)  $\left( \left[ \frac{1}{3a + 1} \right]^2 - 1 \right)^2$
- (k)  $\left( \left[ \frac{1}{a + b} \right]^2 - \left[ \frac{2a + b}{a + b} \right]^2 \right)^3$
- (l)  $((3a + 1)^2 + 2)^3$
- (m)  $((3a)^2 + (2 + b)^3)^2$
- (n)  $[(3a)^2 - (2 + b)^3]^3$
- (o)  $\frac{[(2a)^2 + (3 + b)^3]^2}{[(3a)^2 - (2 + b)^3]^3} + 1$
- (p)  $\left[ \frac{[a^2 - (1 + b)^2]^2}{[2a^2 - (a + b)^2]^3} \right] - 1$
- (q)  $\left[ \frac{a^2 - (1 + b)^2}{2a^2 - (a + b)^2} \right]^2 - \left[ \frac{a^3 - b^2}{[2a^3 - b^2]^3} \right]$
- (r)  $(a + b)^2 - (a + b)(a - b)$

27. Calcule a soma dos algarismos do resultado do produto  $1.000.100 \times 999.900$

28. Sabendo que  $6299816401^2 = a^2 + b^2$ , calcule o produto  $6.299.816.397 \times 6.299.816.405$

29. Se  $m + \frac{1}{m} = 7$ , calcule o valor de  $m^2 + \frac{1}{m^2}$

30. Se  $k - \frac{3}{k} = 2$ , calcule o valor de  $k^3 - \frac{27}{k^3}$

## 0.6 Fatoração

31. Fatore:

- (a)  $3x^2 - 5x + 2$
- (b)  $25a^4 - 81b^2$
- (c)  $9x^2 - 12xy + 4y^2$
- (d)  $4y^2 + 6y - 4$
- (e)  $x^2 - xy + xz - yz$
- (f)  $38x^3b^4c - 95a^2b^5c^3 + 57a^4b^2c^2$
- (g)  $8x^2 - 4x^2y - 18xy^2 + 9y^3$
- (h)  $180x^3y - 5xy^3$
- (i)  $16x^2 - 8xy + y^2$
- (j)  $\frac{x^2}{9} - \frac{y^2}{16}$
- (k)  $8x^3 - 24x^2y - 12x^2 + 18xy^2 + 36xy - 27y^2$
- (l)  $4a^2 - 8ab + 4b^2$
- (m)  $9z^2 + 6z + 1$
- (n)  $(a + b)x + 2(a + b)$
- (o)  $(x + y)^2 - (x - y)^2$
- (p)  $(a + b^2)^4 - (a - b^2)^4$

32. (FAAP-SP) Calcule a expressão  $\frac{2x^2 - 14x + 24}{x^2 - 9}$

33. Dado  $x = 4 + 3^{-2}$ , calcule expressão:

- (a)  $x^2 + x^{-2}$
- (b)  $x + x^{-2}$
- (c)  $(x + x^{-2})^3$
- (d)  $\frac{x^2 + 1}{x^4 - x^2}$
- (e)  $\frac{x^2 + 1}{(1 - x^2)^3} + 1$

34. Dado  $x = a + a^{-1}$ , calcule expressão:

(a)  $x^2 + x^{-2}$

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

(b)  $x + x^{-2}$

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

35. (PUC) Sendo  $x^3 + 1 = (x + 1)(x^2 + ax + b)$  para todo  $x$  real, os valores de  $a$  e  $b$  são, respectivamente:

(a) -1 e -1

(b) 0 e 0

(c) 1 e -1

(d) -1 e 1

(e) 1 e 1

36. (FUVEST) A soma dos quadrados de dois números positivos é 4 e a soma dos inversos de seus quadrados é 1. Determine:

(a) O produto dos dois números

(b) A soma dos dois números