Relatório de Resoluções

O código de cada membro pode ser consultado a seguir:

x_{04}: Beatriz Chessa	x_{11}: Luca Monaco
x_{05}: José Soares Jr.	x_{15}: Rodrigo Melendez
x_{06}: Maurício Damião	x_{18}: Matheus Cardoso
x_{08}: Pedro Lopes Silva	x_{20}: Gustavo Zequini
x_{09}: Rafael Maddalena	

Resolução (‖ Questão: 2.4.1 ‖ Relator: $\mathbf{x}_{20}$ ‖ Revisor: $\mathbf{x}_{11}$ ‖) Simplify the following expressions:

(a) $\frac{3}{7}+\frac{4}{7}-\frac{5}{7}=\frac{2}{7}$

(b) $\frac{3}{4}+\frac{4}{3}-1=\frac{9+16-12}{12}=\frac{13}{12}$

(c) $\frac{3}{12}-\frac{1}{24}=\frac{5}{24}$

(d) $\frac{1}{5}-\frac{2}{25}-\frac{3}{75}=\frac{1}{5}-\frac{2}{5^2}-\frac{3}{3.5^2}=\frac{5-2-1}{25}=\frac{2}{25}$

(e) $\frac{18}{5}-\frac{9}{5}=\frac{9}{5}$

(f) $\frac{3}{5}.\frac{5}{6}=\frac{1}{2}$

(g) $(\frac{\frac{3}{5}}{\frac{2}{5}}).\frac{1}{9}=\frac{3}{5}.\frac{5.3}{2}.\frac{1}{9}=\frac{1}{2}$

(h) $\frac{(\frac{2}{3}+\frac{1}{4})}{(\frac{3}{4}+\frac{3}{2})}=\frac{\frac{11}{12}}{\frac{9}{4}}=\frac{11}{27}$

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Resolução (‖ Questão: 2.4.2 ‖ Relator: $\mathbf{x}_{04}$ ‖ Revisor: $\mathbf{x}_{18}$ ‖) Pede-se para simplificar as expressões:

a) $\frac{x}{10}-\frac{3x}{10}+\frac{17x}{10}=\frac{x}{10}.(1-3+17)=\frac{x}{10}.15=\frac{3}{2}x$

b) $\frac{9a}{10}-\frac{a}{2}+\frac{a}{5}=\frac{9a-5a+2a}{10}=\frac{6a}{10}=\frac{3a}{5}$

c) $\frac{b+2}{10} - \frac{3b}{15} + \frac{b}{10} = \frac{15b+30-30b+15b}{150} = \frac{30}{150} = \frac{1}{5}$

d) $\frac{x+2}{3} + \frac{1-3x}{4} = \frac{4x+8+3-9x}{12} = \frac{11-5x}{12}$

e) $\frac{3}{2b} - \frac{5}{3b} = \frac{9+10}{6b} = \frac{-1}{6b}$

f) $\frac{3a-2}{3a} - \frac{2b-1}{2b} + \frac{4b+3a}{6ab} = \frac{6ab-4b-(6ab-3a)+4b+3a}{6ab} = \frac{6a}{6ab} = \frac{1}{b}$

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Resolução (‖ Questão: 2.4.3 ‖ Relator: $\mathbf{x}_{05}$ ‖ Revisor: $\mathbf{x}_{20}$ ‖)

(a) $\frac{325}{625} = \frac{5.5.13}{5.5.5.5} = \frac{13}{25}$.

(b) $\frac{8a^2b^3c}{64abc^3} = \frac{ab^2}{8c^2}$.

(c) $\frac{2a^2-2b^2}{3a+3b} = \frac{2(a+b)(a-b)}{3(a+b)} = \frac{2(a-b)}{3}$.

(d) $\frac{P^3-PQ^2}{(P+Q)^2} = \frac{P(P^2-Q^2)}{(P+Q)^2} = \frac{P(P+Q)(P-Q)}{(P+Q)^2} = \frac{P(P-Q)}{(P+Q)}$.

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Resolução (‖ Questão: 2.4.4 ‖ Relator: $\mathbf{x}_{06}$ ‖ Revisor: $\mathbf{x}_{04}$ ‖)

4. If $x = \frac{3}{7}$ and $y = \frac{1}{14}$, find the simplest forms of the following fractions:

(a) $x + y \rightarrow \frac{3}{7} + \frac{1}{14} = \frac{6+1}{14} = \frac{7}{14} = \frac{1}{2}$

(b) $\frac{x}{y} \rightarrow \frac{\frac{3}{7}}{\frac{1}{14}} = \frac{3}{7}\frac{14}{1} = 3.2 = 6$

(c) $\frac{x-y}{x+y} \rightarrow \frac{\frac{3}{7}-\frac{1}{14}}{\frac{3}{7}+\frac{1}{14}} = \frac{\frac{6-1}{14}}{\frac{6+1}{14}} = \frac{\frac{5}{14}}{\frac{1}{2}} = \frac{5}{14}.2 = \frac{10}{14} = \frac{5}{7}$

(d) $\frac{13(2x-3y)}{2x+1} \rightarrow \frac{13(2\frac{3}{7}-3\frac{1}{14})}{2\frac{3}{7}+1} = \frac{13(\frac{12}{14}-\frac{3}{14})}{\frac{6}{7}+\frac{7}{7}} = \frac{13(\frac{9}{14})}{\frac{13}{7}} = \frac{\frac{9}{14}}{\frac{1}{7}} = \frac{9}{14}.7 = \frac{9}{2}$

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Resolução (‖ Questão: 2.4.5 ‖ Relator: $\mathbf{x}_{08}$ ‖ Revisor: $\mathbf{x}_{05}$ ‖)

Expand the following expressions:

(a)

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

(b)

$$\frac{6x+25}{4x+2} - \frac{6x^2+x-2}{4x^2-1} = \frac{6x+25}{2(2x+1)} - \frac{6x^2+x-2}{(2x+1)(2x-1)} = \frac{12x^2-6x+50x-25}{2(2x+1)(2x-1)} - \frac{12x^2+2x-4}{2(2x+1)(2x-1)} \tag{2}$$

$$= \frac{42x-21}{2(2x+1)(2x-1)} = \frac{21(2x-1)}{2(2x+1)(2x-1)} = \frac{21}{2(2x+1)} \tag{3}$$

(c)

$$\frac{18b^2}{a^2-9b^2}-\frac{a}{a+3b}+2=\frac{18b^2}{(a-3b)(a+3b)}-\frac{a^2-3ab}{(a-3b)(a+3b)}+\frac{2a^2-18b^2}{(a-3b)(a+3b)}=\frac{a^2+3ab}{(a-3b)(a+3b)} \quad (4)$$

$$=\frac{(a+3b)(a)}{(a-3b)(a+3b)}=\frac{a}{a-3b} \quad (5)$$

(d)

$$\frac{1}{8ab}-\frac{1}{8b(a+2)}=\frac{8b(a+2)}{64ab^2(a+2)}-\frac{8ab}{64ab^2(a+2)}=\frac{16b}{64ab^2(a+2)}=\frac{1}{4ab(a+2)} \quad (6)$$

(e)

$$\frac{t(2-t)}{t+2}\cdot(\frac{3t}{t-2})=\frac{3t^2(2-t)}{(t+2)(t-2)}=\frac{(-1)3t^2(t-2)}{(t+2)(t-2)}=-\frac{3t^2}{t+2} \quad (7)$$

(f)

$$2-\frac{a(1-\frac{1}{2a})}{0.25}=2-4a(1-\frac{1}{2a})=2-4a+\frac{4a}{2a}=2-4a+2=4(1-a) \quad (8)$$

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Resolução (‖ Questão: 2.4.6 ‖ Relator: $\mathbf{x}_{09}$ ‖ Revisor: $\mathbf{x}_{06}$ ‖)

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

b) $\frac{t}{2t+1}-\frac{t}{2t-1}=\frac{t(2t-1)-t(2t+1)}{4t^2-1}=\frac{2t^2-t-2t^2-t}{4t^2-1}=\frac{-2t}{4t^2-1}$

c) $\frac{3x}{x+2}-\frac{4x}{2-x}-\frac{2x-1}{x^2-4}=\frac{3x}{x+2}+\frac{4x}{x-2}-\frac{2x-1}{(x+2)(x-2)}=\frac{3x(x-2)+4x(x+2)-(2x-1)}{(x-2)(x+2)}=$
$\frac{-6x+3x^2+4x^2+8x-2x+1}{x^2-4}=\frac{7x^2+1}{x^2-4}$

d) $\frac{\frac{1}{x}+\frac{1}{y}}{\frac{1}{xy}}=\frac{xy}{x}+\frac{xy}{y}=x+y$

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

f) $\frac{\frac{a}{x}-\frac{a}{y}}{\frac{a}{x}+\frac{a}{y}}=\frac{\frac{a}{x}-\frac{a}{y}}{\frac{ay+ax}{xy}}=\frac{(\frac{a}{x}-\frac{a}{y})xy}{a(y+x)}=\frac{ax-ay}{a(y+x)}=\frac{y-x}{x+y}$

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Resolução (‖ Questão: 2.4.7 ‖ Relator: $\mathbf{x}_{11}$ ‖ Revisor: $\mathbf{x}_{08}$ ‖)

7) Verify that $x^2+2xy-3y^2=(x+3y)(x-y)$, and then simplify the expression:

$$\frac{x-y}{x^2+2xy-3y^2} - \frac{2}{(x-y)} - \frac{7}{(x+3y)}$$

1.) $(x+3y)(x-y) = x^2 - xy + 3xy - 3y^2 = x^2 + 2xy - 3y^2$

$$2.)\frac{x-y}{(x+3y)(x-y)} - \frac{2(x+3y)}{(x-y)(x+3y)} - \frac{7(x-y)}{(x+3y)(x-y)} = \frac{x-y-2x-6y-7x+7y}{x^2+2xy-3y^2} = \frac{-8x}{x^2+2xy-3y^2} \quad (9)$$

$$= -\frac{8x}{x^2+2xy-3y^2} \quad (10)$$

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Resolução (‖ Questão: 2.4.8 ‖ Relator: $\mathbf{x}_{15}$ ‖ Revisor: $\mathbf{x}_{08}$ ‖))

Simplify the following expressions:

(a) $(\frac{1}{4} - \frac{1}{5})^{-2} = (\frac{(5)(1)-(4)(1)}{(5)(4)})^{-2} = (\frac{5-4}{20})^{-2} = \frac{1}{20^{-2}} = 20^2 = 400$

(b) $n - \frac{n}{1-\frac{1}{n}} = n - \frac{n}{\frac{n}{n}-\frac{1}{n}} = n - \frac{n}{\frac{n-1}{n}} = n - n.\frac{n}{n-1} = n - \frac{n^2}{n-1} = n\frac{n-1}{n-1} - \frac{n^2}{n-1} = \frac{n(n-1)}{n-1} - \frac{n^2}{n-1} = \frac{n^2-n-n^2}{n-1} = -\frac{n}{n-1}$

(c) $\frac{1}{1+x^{p-q}} + \frac{1}{1+x^{q-p}} = \frac{(1+x^{p-q})+(1+x^{q-p})}{(1+x^{p-q})(1+x^{q-p})} = \frac{2+x^{q-p}+x^{p-q}}{1+x^{q-p}+x^{p-q}+x^0} = \frac{2+x^{q-p}+x^{p-q}}{1+x^{q-p}+x^{p-q}+1} = \frac{2+x^{q-p}+x^{p-q}}{2+x^{q-p}+x^{p-q}} = 1$

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

(e) $\frac{\frac{1}{(x+h)^2}-\frac{1}{x^2}}{h} = \frac{\frac{x^2-(x+h)^2}{(x+h)^2x^2}}{h} = \frac{\frac{x^2-(x^2+2xh+h^2)}{(x+h)^2x^2}}{h} = \frac{\frac{-2xh-h^2}{(x+h)^2x^2}}{h} = \frac{h(-2x-h)}{(x+h)^2x^2}.\frac{1}{h} = -\frac{2x+h}{(x+h)^2x^2}$

(f) $\frac{\frac{10x^2}{(x^2-1)}}{\frac{5x}{x+1}} = \frac{10x^2}{x^2-1}.\frac{x+1}{5x} = \frac{10x^2}{(x+1)(x-1)}.\frac{x+1}{5x} = \frac{10x^2}{x-1}.\frac{1}{5x} = \frac{10x^2}{5x^2-5x} = \frac{10x^2}{5x(x-1)} = \frac{2x}{x-1}$

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