

$$1. \quad \frac{4}{2a+3} - 1 = \frac{4-1(2a+3)}{(2a+3)} = \frac{4-2a-3}{(2a+3)} = \frac{1-2a}{\underline{\underline{(2a+3)}}$$

$$2. \quad 1 - \frac{2x+1}{x+1} = \frac{x+1-(2x+1)}{(x+1)} = \frac{x+1-2x-1}{(x+1)} = \frac{-x}{\underline{\underline{(x+1)}}$$

$$3. \quad \frac{e+f}{e-f} + \frac{e}{f} + 1 = \frac{f(e+f)+e(e-f)+f(e-f)}{f(e-f)} = \frac{ef+f^2+e^2-ef+ef-f^2}{f(e-f)} = \frac{e^2+ef}{f(e-f)} =$$

$$\frac{\underline{\underline{e(e+f)}}}{\underline{\underline{f(e-f)}}$$

$$4. \quad \frac{p}{q} - \frac{p-q}{p+q} - 1 = \frac{p(p+q)-q(p-q)-q(p+q)}{q(p+q)} = \frac{p^2+pq-pq+q^2-pq-q^2}{q(p+q)} =$$

$$\frac{\underline{\underline{p^2-pq}}}{\underline{\underline{q(p+q)}}} = \frac{\underline{\underline{p(p-q)}}}{\underline{\underline{q(p+q)}}$$

$$5. \quad \frac{5a}{2b+4} - \frac{4a}{6b+12} - \frac{3a}{10b+20} = \frac{5a}{2(b+2)} - \frac{4a}{6(b+2)} - \frac{3a}{10(b+2)} = \frac{75a-20a-9a}{30(b+2)} =$$

$$\frac{\underline{\underline{46a}}}{\underline{\underline{30(b+2)}}} = \frac{\underline{\underline{23a}}}{\underline{\underline{15(b+2)}}$$

$$6. \quad \frac{z+1}{3x-1} - \frac{z+2}{9x-3} + \frac{z+3}{12x-4} = \frac{z+1}{(3x-1)} - \frac{z+2}{3(3x-1)} + \frac{z+3}{4(3x-1)} =$$

$$\frac{12(z+1)-4(z+2)+3(z+3)}{12(3x-1)} = \frac{12z+12-4z-8+3z+9}{12(3x-1)} = \frac{11z+13}{\underline{\underline{12(3x-1)}}$$

$$7. \quad \frac{2u+v}{4x-2y} + \frac{u-2v}{8x-4y} - \frac{2u+2v}{6x-3y} = \frac{2u+v}{2(2x-y)} + \frac{u-2v}{4(2x-y)} - \frac{2u+2v}{3(2x-y)} =$$

$$\frac{6(2u+v)+3(u-2v)-4(2u+2v)}{12(2x-y)} = \frac{12u+6v+3u-6v-8u-8v}{12(2x-y)} = \frac{\underline{\underline{7u-8v}}}{\underline{\underline{12(2x-y)}}$$

$$8. \frac{1}{2xz+4yz} - \frac{1}{3xz+6yz} + \frac{1}{6xz+12yz} = \frac{1}{2z(x+2y)} - \frac{1}{3z(x+2y)} + \frac{1}{6z(x+2y)} =$$

$$\frac{3-2+1}{6z(x+2y)} = \frac{2}{6z(x+2y)} = \underline{\underline{\frac{1}{3z(x+2y)}}}$$

$$9. \frac{a+3}{a-4} - \frac{a-1}{a+4} - \frac{10a}{a^2-16} = \frac{a+3}{(a-4)} - \frac{a-1}{(a+4)} - \frac{10a}{(a+4)(a-4)} =$$

$$\frac{(a+3)(a+4) - (a-1)(a-4) - 10a}{(a+4)(a-4)} = \frac{a^2+3a+4a+12 - (a^2-a-4a+4) - 10a}{(a+4)(a-4)} =$$

$$\frac{a^2+3a+4a+12 - a^2+a+4a-4 - 10a}{(a+4)(a-4)} = \frac{2a+8}{(a+4)(a-4)} = \frac{2(a+4)}{(a+4)(a-4)} = \underline{\underline{\frac{2}{(a-4)}}}$$

$$10. \frac{2a}{a+5b} - \frac{a(a-11b)}{a^2-25b^2} - \frac{3b}{a-5b} = \frac{2a}{(a+5b)} - \frac{a^2-11ab}{(a+5b)(a-5b)} - \frac{3b}{(a-5b)} =$$

$$\frac{2a(a-5b) - (a^2-11ab) - 3b(a+5b)}{(a+5b)(a-5b)} = \frac{2a^2-10ab - a^2+11ab - 3ab-15b^2}{(a+5b)(a-5b)} =$$

$$\frac{a^2-2ab-15b^2}{(a+5b)(a-5b)} = \frac{(a-5b)(a+3b)}{(a+5b)(a-5b)} = \underline{\underline{\frac{(a+3b)}{(a+5b)}}}$$

$$11. \frac{4u}{u^2+u} - \frac{4}{2u-2} + \frac{4}{u^2-1} = \frac{4u}{u(u+1)} - \frac{4}{2(u-1)} + \frac{4}{(u+1)(u-1)} =$$

$$\frac{8u(u-1) - 4u(u+1) + 8u}{2u(u+1)(u-1)} = \frac{8u^2-8u-4u^2-4u+8u}{2u(u+1)(u-1)} = \frac{4u^2-4u}{2u(u+1)(u-1)} =$$

$$\frac{4u(u-1)}{2u(u+1)(u-1)} = \underline{\underline{\frac{2}{(u+1)}}}$$

$$12. \frac{3b}{a^2b+ab^2} - \frac{3}{a^2-ab} + \frac{2}{ab+b^2} = \frac{3b}{ab(a+b)} - \frac{3}{a(a-b)} + \frac{2}{b(a+b)} =$$

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

$$\frac{2a^2-2ab}{ab(a+b)(a-b)} = \frac{2a(a-b)}{ab(a+b)(a-b)} = \underline{\underline{\frac{2}{b(a+b)}}}$$

$$13. \frac{x}{x-2y} - \frac{4y}{2x+4y} + \frac{40xy}{5x^2-20y^2} = \frac{x}{(x-2y)} - \frac{4y}{2(x+2y)} + \frac{40xy}{5(x+2y)(x-2y)} =$$

$$\frac{10x(x+2y)-20y(x-2y)+80xy}{10(x+2y)(x-2y)} = \frac{10x^2+20xy-20xy+40y^2+80xy}{10(x+2y)(x-2y)} =$$

$$\frac{10x^2+80xy+40y^2}{10(x+2y)(x-2y)} = \frac{10(x^2+8xy+4y^2)}{10(x+2y)(x-2y)} = \frac{10(x+2y)(x+2y)}{10(x+2y)(x-2y)} = \frac{(x+2y)}{\underline{\underline{(x-2y)}}}$$

$$14. \frac{a+1}{a+2} - \frac{a-5}{a-1} + \frac{1}{3} = \frac{3(a+1)(a-1)-3(a-5)(a+2)+(a+2)(a-1)}{3(a+2)(a-1)} =$$

$$\frac{3(a^2-1)-3(a^2-5a+2a-10)+(a^2+2a-a-2)}{3(a+2)(a-1)} = \frac{3a^2-3-3(a^2-3a-10)+a^2+a-2}{3(a+2)(a-1)} =$$

$$\frac{3a^2-3-3a^2+9a+30+a^2+a-2}{3(a+2)(a-1)} = \frac{a^2+10a+25}{3(a+2)(a-1)} = \frac{(a+5)(a+5)}{\underline{\underline{3(a+2)(a-1)}}}$$

$$15. \frac{3}{b-1} + \frac{4}{b+1} + \frac{5}{1-b} = \frac{3}{(b-1)} + \frac{4}{(b+1)} - \frac{5}{-1(b-1)} = \frac{3}{(b-1)} + \frac{4}{(b+1)} - \frac{5}{(b-1)} =$$

$$\frac{3(b+1)+4(b-1)-5(b+1)}{(b+1)(b-1)} = \frac{3b+3+4b-4-5b-5}{b(b+1)(b-1)} = \frac{2b-6}{b(b+1)(b-1)} = \frac{2(b-3)}{\underline{\underline{(b+1)(b-1)}}}$$

$$16. \frac{2}{c+1} + \frac{1}{c+3} - \frac{3}{c-1} = \frac{2(c+3)(c-1)+(c+1)(c-1)-3(c+1)(c+3)}{(c+1)(c+3)(c-1)} =$$

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

$$\frac{-8c-16}{(c+1)(c+2)(c-1)} = \frac{-8(c+2)}{(c+1)(c+2)(c-1)} = \frac{-8}{\underline{\underline{(c+1)(c-1)}}}$$

$$17. \frac{1}{d+2} - \frac{2}{d} + \frac{1}{d-3} = \frac{d(d-3)-2(d+2)(d-3)+d(d+2)}{d(d+2)(d-3)} =$$

$$\frac{d^2-3d-2(d^2+2d-3d-6)+d^2+2d}{d(d+2)(d-3)} = \frac{d^2-3d-2d^2-4d+6d+12+d^2+2d}{d(d+2)(d-3)} =$$

$$\frac{d+12}{\underline{\underline{d(d+2)(d-3)}}}$$