R5 p8

Exercise

Perform & simplify.

$$\frac{x^2-1}{2x+2} \div \frac{x^2+x-2}{2} - \frac{1}{x^2+5x+6}$$

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

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

$$= \boxed{\frac{1}{x+3}}$$

Exp. $\dfrac{1}{4-\dfrac{3}{2+\dfrac{x}{1-x}}}$, $\dfrac{1}{2+\dfrac{3}{1+\dfrac{4}{x}}}$

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

$$= \frac{1}{\dfrac{4(2-x)-3+3x}{2-x}} = \frac{1}{\dfrac{8-4x-3+3x}{2-x}} = \frac{2-x}{-x+5}$$

$$= \boxed{\frac{x-2}{x-5}}$$

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Exp. Simplify $\dfrac{x-y}{x+y} \cdot \dfrac{x^{-2}+y^{-2}}{x^{-2}-y^{-2}}$

$$\frac{x-y}{x+y} \cdot \frac{\frac{1}{x^2}+\frac{1}{y^2}}{\frac{1}{x^2}-\frac{1}{y^2}} \quad \text{LCD} = x^2y^2 \quad \frac{(x-y)\left(\frac{1}{x^2}+\frac{1}{y^2}\right)x^2y^2}{(x+y)\left(\frac{1}{x^2}-\frac{1}{y^2}\right)(x^2y^2)}$$

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

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

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

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

Exp Find the LCD of $\dfrac{1}{12(x^2-y^2)^2} + \dfrac{1}{36(x^3-y^3)} + \dfrac{2x}{24(x-y)^3}$

$12(x^2-y^2)^2 = 2^2 \cdot 3\,(x-y)^2(x+y)^2$

$36(x^3-y^3) = 2^2 \cdot 3^2 (x-y)(x^2+xy+y^2)$

$24(x-y)^3 = 2^3 \cdot 3\,(x-y)^3$

$\Rightarrow$ LCD $= 2^3 \cdot 3^2 (x-y)^3(x+y)^2(x^2+xy+y^2)$

$$\boxed{\text{LCD} = 72\,(x-y)^3(x+y)^2(x^2+xy+y^2)}$$