Lesson 4.3: Adding and Subtracting Rationals

Remember...

$$\frac{7}{6} - \frac{5}{6} = \frac{2}{6} = \boxed{\frac{1}{3}}$$

$$\frac{4}{4} \cdot \frac{1}{3} + \frac{1}{4} \cdot \frac{3}{3} = \frac{4}{12} + \frac{3}{12} = \boxed{\frac{7}{12}}$$

1) Factor the denominators
2) Multiply by the "missing" factors
3) Add/Subtract Numerators
4) Simplify, if possible

* Skip 1 and 2 if denominators are the same.

$$\frac{2x}{x^2-1} + \frac{-1x+1}{x^2-1}$$

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

4 $$\frac{1\cancel{(x+1)}}{\cancel{(x+1)}(x-1)} = \boxed{\frac{1}{x-1}}$$

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

$$\frac{2x+1}{2x+1} = \boxed{1}$$

$$\frac{2}{2}\cdot\frac{4}{x^2}+\frac{3}{2x}\cdot\frac{x}{x}$$

$$\rightarrow \quad \frac{8}{2x^2}+\frac{3x}{2x^2} = \boxed{\frac{3x+8}{2x^2}}$$

$$\frac{x^2}{x^2}\cdot\frac{2}{3x}+\frac{1}{x^3}\cdot\frac{3}{3}$$

$$\frac{2x^2}{3x^3}+\frac{3}{3x^3} = \boxed{\frac{2x^2+3}{3x^3}}$$

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$$\frac{4x+1}{2xy} - \frac{3}{2y} \cdot \frac{x}{x}$$

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

$$\frac{(x-3)\,2x}{(x-3)(x+3)} - \frac{x+1}{\cancel{x^2-9}\;(x+3)(x-3)}$$

$$\frac{2x^2-6x}{(x-3)(x+3)} + \frac{-x+-1}{(x+3)(x-3)}$$

$$\boxed{\frac{2x^2-7x-1}{(x-3)(x+3)}}$$

$$\frac{7x}{\cancel{x^2-64}} + \frac{3}{(x+8)}\,(x-8)$$

$$(x+8)(x-8)$$

$$\frac{7x}{(x+8)(x-8)} + \frac{3x-24}{(x+8)(x-8)}$$

$$= \boxed{\frac{10x-24}{(x+8)(x-8)}} = \frac{2(5x-12)}{(x+8)(x-8)}$$

$$\frac{(x+4)\,2}{(x+4)\,(x-2)} + \frac{x\,(x-2)}{(x-2)}$$

$$\frac{2x+8}{(x+4)(x-2)} + \frac{x^2-2x}{(x+4)(x-2)}$$

$$\boxed{\frac{x^2+8}{(x+4)(x-2)}}$$

$$\frac{(x+1)}{(x+1)} \cdot \frac{1}{\underbrace{2x-2}_{2(x-1)}} + \frac{3}{(x+1)} \cdot \frac{2(x-1)}{2(x-1)} + \frac{x}{\underbrace{x^2-1}_{(x+1)(x-1)}} \cdot \frac{2}{2}$$

$$\frac{x+1}{2(x+1)(x-1)} + \frac{6x-6}{2(x+1)(x-1)} + \frac{2x}{2(x+1)(x-1)}$$

$$\boxed{\frac{9x-5}{2(x+1)(x-1)}}$$