

4.4: Add/Subtract rational expressions

- Steps:
- 1) get a common denominator (factor to find LCD)
 - 2) combine numerators
 - 3) clean up numerator
 - 4) simplify (factor to cancel)

EX 1) $\frac{5}{x+3} + \frac{5}{x^2-9} = \frac{5}{(x+3)} + \frac{5}{(x+3)(x-3)}$

$\sqrt{x^2} = x$
 $\sqrt{9} = 3$

LCD: $(x+3)(x-3)$

$$= \frac{5}{(x+3)} \cdot \frac{(x-3)}{(x-3)} + \frac{5}{(x+3)(x-3)}$$
$$= \frac{5(x-3) + 5}{(x+3)(x-3)}$$
$$= \frac{5x - 15 + 5}{(x+3)(x-3)}$$
$$= \frac{5x - 10}{(x+3)(x-3)}$$
$$= \frac{5(x-2)}{(x+3)(x-3)}$$

$x \neq \pm 3$

$$\text{Ex 2) } \frac{2}{(x+3)} - \frac{5}{(x+4)} = \frac{2}{(x+3)} \cdot \frac{(x+4)}{(x+4)} - \frac{5}{(x+4)} \cdot \frac{(x+3)}{(x+3)}$$

$$\text{LCD: } (x+3)(x+4) = \frac{2(x+4) - 5(x+3)}{(x+3)(x+4)}$$

$$= \frac{2x+8-5x-15}{(x+3)(x+4)}$$

$$= \frac{-3x-7}{(x+3)(x+4)}$$

$x \neq -3, -4$

you try: $\frac{h+8}{h^2-4h+4} + \frac{h-1}{h^2-4} = \frac{h+8}{(h-2)(h-2)} + \frac{h-1}{(h+2)(h-2)}$

$$\text{LCD: } (h-2)(h-2)(h+2)$$

(h^2-4h+4) $4h^2$ $\sqrt{h^2}=h$
 $-2h + -2h = -4h$ $\sqrt{4}=2$

$(h+2)(h-2)$

$$\frac{h^2-2h-2h+4}{h(h-2)} \Big| \frac{-2}{-2} = \frac{-2(h-2)}{(h-2)(h-2)}$$

$$= \frac{h+8}{(h-2)(h-2)} \cdot \frac{(h+2)}{(h+2)} + \frac{(h-1)(h-2)}{(h+2)(h-2)}$$

$$= \frac{(h+8)(h+2) + (h-1)(h-2)}{(h-2)(h-2)(h+2)}$$

$$= \frac{h^2 + 2h + 8h + 16 + h^2 - 2h - 2}{(h-2)(h-2)(h+2)}$$

$$= \frac{2h^2 + 7h + 18}{(h-2)(h-2)(h+2)}$$

$h \neq \pm 2$

Ex 3) $\frac{7}{3x^4y^7} - \frac{1}{8x^5y^3} = \frac{7}{3x^4y^7} \cdot \frac{8x}{8x} - \frac{1}{8x^5y^3} \cdot \frac{3y^4}{3y^4}$

LCD: $24x^5y^7$

$$= \frac{7(8x) - 1(3y^4)}{24x^5y^7}$$
$$= \boxed{\frac{56x - 3y^4}{24x^5y^7}}$$

$x \neq 0$
 $y \neq 0$