4.3: Add & Subtract Rational Expressions

Ex 1) $\frac{7x}{100x^2-1} + \frac{3x+1}{100x^2-1} = \frac{7x+3x+1}{100x^2-1}$

Steps: 1) find common denominator
2) combine numerators
3) clean up numerator
4) simplify (factor & cancel, if possible)

$= \frac{10x+1}{100x^2-1}$

$= \frac{10x+1}{(10x+1)(10x-1)}$

$x \neq \pm\frac{1}{10}$

$= \boxed{\frac{1}{10x-1}}$

Ex 2) $\frac{2m-3}{5m^2} - \frac{3m-4}{5m^2} = \frac{2m-3-(3m-4)}{5m^2}$

$= \frac{2m-3-3m+4}{5m^2}$

$= \boxed{\frac{-m+1}{5m^2}}$ $m \neq 0$

Ex 3) Find the LCD for:

a) $\frac{3}{x-6} + \frac{4x}{x^2-8x+12} = \frac{3}{(x-6)} + \frac{4x}{(x-6)(x-2)}$

LCD: $(x-6)(x-2)$

b) $\frac{8x+3}{(x-4)} - \frac{2x+6}{(x+4)} =$ LCD: $(x-4)(x+4)$

c) $\frac{9x}{x^2+8x+15} + \frac{8}{x^2+4x+3} = \frac{9x}{(x+5)(x+3)} + \frac{8}{(x+3)(x+1)}$

LCD: $(x+5)(x+3)(x+1)$

d) $\frac{8}{7x^3y^6} - \frac{1}{3x^4y^4} =$

$7 \cdot 14 \cdot (21) \cdot 28 \ldots$

$3 \cdot 6 \cdot 9 \cdot 12 \cdot 15 \cdot 18 \cdot (21)$

LCD: $21x^4y^6$

Ex 4) $\frac{5}{v+3} + \frac{5}{v^2-9} = \frac{5}{(v+3)} + \frac{5}{(v+3)(v-3)}$

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

$= \frac{5}{(v+3)} \cdot \frac{(v-3)}{(v-3)} + \frac{5}{(v+3)(v-3)}$

$= \frac{5(v-3)+5}{(v+3)(v-3)}$

$= \frac{5v-15+5}{(v+3)(v-3)}$

$= \frac{5v-10}{(v+3)(v-3)}$

$= \boxed{\frac{5(v-2)}{(v+3)(v-3)}}$ $v \neq \pm 3$

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

LCD: $(x+3)(x+4)$

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

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

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

Ex 6) $\frac{7}{3x^4y^7} + \frac{1}{8x^5y^5} = \frac{7}{3x^4y^7} \cdot \frac{8x}{8x} + \frac{1}{8x^5y^5} \cdot \frac{3y^2}{3y^2}$

LCD: $24x^5y^7$

$= \frac{7(8x) + 1(3y^2)}{24x^5y^7}$

$= \boxed{\frac{56x + 3y^2}{24x^5y^7}}$

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