ADDING / SUBTRACTING RATIONAL EXPRESSIONS W/ POLYNOMIAL DENOMINATORS

$$\frac{2}{x^2-9} + \frac{5}{x^2+x-6}$$

-6

$3 \quad -2$

$(x^2+3x)(-2x-6)$

$x(x+3)-2(x+3)$

$(x-2)(x+3)$

$(x+3)(x-3)$

Common Denominator:

$(x+3)(x-3)(x-2)$

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

$$\frac{2x-4}{(x-2)(x-3)(x+3)} + \frac{5x-15}{(x-2)(x-3)(x+3)} = \frac{7x-19}{(x-2)(x-3)(x+3)}$$

STEPS:

1. FACTOR ALL THE DENOMINATORS.
2. CHOOSE THE COMMON DENOM.
3. MULTIPLY IN THE MISSING FACTORS TO GET THE COMMON DENOM.
4. DISTRIBUTE THE TOPS & COMBINE LIKE TERMS

$$\frac{(z+1)\,4z}{(z+1)\,z-4} + \frac{z+4}{z+1}\,\frac{(z-4)}{(z-4)}$$

$$\text{c.d.} = (z-4)(z+1)$$

$$\frac{4z^2+4z}{(z-4)(z+1)} + \frac{z^2-16}{(z-4)(z+1)} = \frac{5z^2+4z-16}{(z-4)(z+1)}$$

$$\frac{2x+1}{x-5} - \frac{4}{x^2-3x-10}$$

-10

$-5 \quad 2$

$$\frac{(x+2)\,2x+1}{(x+2)\,x-5} - \frac{4}{(x-5)(x+2)}$$

C.D.: $(x-5)(x+2)$

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

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

$$\frac{3}{y^2+y-12} - \frac{2}{y^2+6y+8}$$

-12

$4 \quad -3$

$(y^2+4y)(-3y-12)$

$y(y+4)-3(y+4)$

8

$4 \quad 2$

$(y^2+4y)(-2y+8)$

$-1(y+4)+2(y+4)$

C.D.: $(y+4)(y-3)(y+2)$

$$\frac{3}{(y+4)(y-3)} - \frac{2}{(y+4)(y+2)}$$

$$\frac{(y+2)\,3}{(y+2)\,(y+4)(y-3)} - \frac{2\,(y-3)}{(y+4)(y+2)\,(y-3)}$$

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

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