

RATIONAL FUNCTIONS

SIMPLIFY.

$$\frac{4x^2(x+3)^{-2} - 24x^1(x+3)^{-1+2}}{(x+3)^3}$$

$$\frac{4x(x+3)^{-2} [x - 6(x+3)]}{(x+3)^{3+2}}$$

$$\frac{4x [x - 6x - 18]}{(x+3)^5}$$

$$\frac{4x [-5x - 18]}{(x+3)^5}$$

$$\text{OR } \frac{-4x [5x + 18]}{(x+3)^5}$$

* Simplify Messy Rational expressions
* Solve rational eqs. & inequalities

Pull out common factors!

$$\begin{aligned} x^4 - x^{7-4} \\ x^4(1 - x^3) \end{aligned}$$

$$\frac{6(2x+5)^3(4x-7x^2)^{-1/4}(4-7x) - (4x-7x^2)^{3/4+1/4}(10)(2x+5)^2}{[(2x+5)^3]^2}$$

$$\frac{2(2x+5)^2(4x-7x^2)^{-1/4} [3(2x+5)(4-7x) - 5(4x-7x^2)]}{(2x+5)^6}$$

$$\frac{2 \cdot (2x+5)^2 \cdot [3(-14x^2 - 27x + 20) - 20x + 35x^2]}{(4x-7x^2)^{1/4} (2x+5)^6}$$

$$\frac{2(2x+5)^2 [24x - 42x^2 + 60 - 105x - 20x + 35x^2]}{(4x-7x^2)^{1/4} (2x+5)^6}$$

$$\frac{2(2x+5)^2 [-7x^2 - 101x + 60]}{(4x-7x^2)^{1/4} (2x+5)^6}$$

SOLVING RATIONAL EQUATIONS + INEQUALITIES

$$\begin{matrix} 2(x+1) \\ (x+1) \end{matrix} \left[\frac{1}{\cancel{2x+1}} + \frac{1}{\cancel{x+1}} = \frac{3}{\cancel{2}} \right] \begin{matrix} 2(x+1) \\ (2x-1) \end{matrix} \quad \text{Excluded values}$$

$$x \neq \frac{1}{2}, -1$$

$$2(x+1) + 2(2x-1) = 3(x+1)(2x-1)$$

$$2x + \cancel{2} + 4x - \cancel{2} = 3(2x^2 + x - 1)$$

$$\begin{array}{r} 6x = 6x^2 + 3x - 3 \\ -6x \quad \quad -6x \end{array}$$

$$0 = 6x^2 - 3x - 3$$

$$0 = 3(2x^2 - x - 1)$$

$$0 = 3(2x+1)(x-1)$$

$$2x+1=0 \quad x-1=0$$

$$\boxed{x = -1/2 \quad x = 1}$$

← Double check excluded values

$$\frac{4x}{x^2-3x+2} + \frac{3x}{x^2-4} = 7$$

$$\begin{matrix} (x-1) \\ (x-2) \\ (x+2) \end{matrix} \left[\frac{4x}{(x-1)(x-2)} + \frac{3x}{(x-2)(x+2)} = 7 \right]$$

$$\underset{-2}{1} + \frac{3y}{\underset{-2}{y-1}} > 2$$

$$\frac{3y}{y-1} - \frac{1(y-1)}{1(y-1)} \geq 0$$

$$\frac{3y - y + 1}{y-1} \geq 0$$

$$\frac{2y+1}{y-1} \geq 0$$

$$(-\infty, -\frac{1}{2}] \cup (1, \infty)$$

* Cannot multiply by
a variable expression
+ cancel denom!

- 1) Set < 0 or > 0
- 2) Make common denom.
- 3) Test Points!

