RATIONAL FUNCTIONS

SIMPLIFY.

Pull out common factors

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

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

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

$$x^6 - x^{23-6}$$

$$x^6(1 - x^{17})$$

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

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

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

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

$$\frac{2\left[3(8x-14x^2+20.-35x) - 20x + 35x^2\right]}{(2x+5)^4(4x-7x^2)^{1/4}}$$

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

$$\frac{2\left[-7x^2 - 101x + 60\right]}{(2x+5)^4(4x-7x^2)}$$

Solving Rational Equations & Inequalities

$$\frac{2}{(2x-1)}(x+1)\left[\frac{1}{2x-1} + \frac{1}{x+1} = \frac{3}{2}\right]$$

$$\overset{2(2x-1)(x+1)}{} \quad \overset{2(2x-1)(x+1)}{}$$

Excluded values

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

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

$$0 = 6x^2 - 3x - 3$$
$$0 = 3(2x^2 - x - 1)$$
$$0 = 3(2x+1)(x-1)$$
$$\boxed{x = -\tfrac{1}{2}, 1}$$

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

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

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

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

※ Cannot multiply by a variable expression + cancel denom.!

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

$$-\frac{1}{2} \qquad 1$$

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

Write the equation of the polynomial given its roots.

b) Roots: $-5, \frac{1}{2}, 4$

$x = -5 \qquad x = \frac{1}{2} \qquad x = 4$

$x + 5 = 0 \qquad 2x = 1 \qquad x - 4 = 0$

$\qquad\qquad\qquad 2x - 1 = 0$

$(x+5)(2x-1)(x-4) = 0 \qquad \boxed{2x^3 + x^2 - 41x + 20}$