# Rational Functions

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

## Simplify.

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

* Pull out common factors!

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

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

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

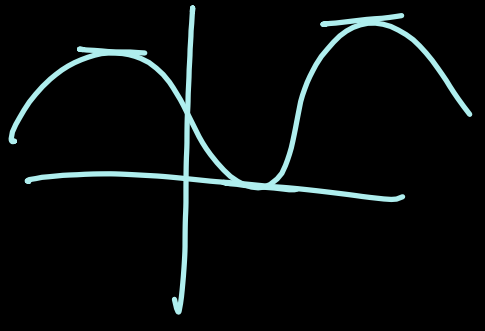
$$\frac{6(2x+5)^{3/2}(4x-7x^2)^{-1/4}(4-7x) - (4x-7x^2)^{3/4+1/4}(10)(2x+5)^2}{[(2x+5)^3]^2}$$

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

$$\frac{2[3(\overset{-14x^2-27x+20}{8x-14x^2+20-35x}) - 20x + 35x^2]}{(4x-7x^2)^{1/4}(2x+5)^4}$$

$$\frac{2[-42x^2-81x+60-20x+35x^2]}{(4x-7x^2)^{1/4}(2x+5)^4}$$

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



# Solving Rational Equations & Inequalities

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

Excluded values: $x \neq \frac{1}{2}, -1$

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

$$2x+2+4x-2 = 3(2x^2+x-1)$$

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

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

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

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

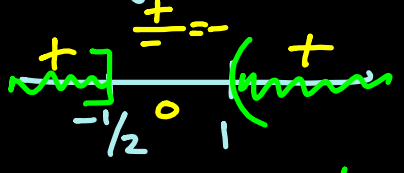
$$x = -\frac{1}{2}, 1$$

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

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

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

$$\frac{2y+1}{y-1} \geq 0 \quad \leftarrow \text{need + solutions}$$




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

* Cannot multiply by a variable expression + cancel denom!

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

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