Rational Equations + Inequalities

$$\frac{7}{p+2} - \frac{1}{p^2+5p+6} = \frac{-2}{p+3}$$

$$(p+2)(p+3)$$

$p \neq -2, -3$

$$7(p+3) - 1 = -2(p+2)$$

$$7p + 21 - 1 = -2p - 4$$

$$-20$$

$$\frac{9p}{9} = \frac{-24}{9}$$

$$p = -8/3$$

$p = 5$ ~~$p = -3$~~ ← extraneous solution

1) Factor denominators
2) Identify excluded values
3) Multiply by common denom. to cancel all denominators.
4) Solve
5) Check for excluded values.

A plane travels at a rate of 420 mph in still air. If travels 720 miles against a headwind + then returns in a total of 3.5 hours. What is the speed of the wind?

$R \cdot T = D \quad R = \frac{D}{T} \quad T = \frac{D}{R}$

	D ÷ R = T		
with	720	$420+x$	$\frac{720}{420+x}$
against	720	$420-x$	$\frac{720}{420-x}$

x = speed of wind

$x \neq -400, 400$

$(420+x)(420-x)\left[\frac{720}{420+x} + \frac{720}{420-x} = 3.5\right]$

$720(420-x) + 720(420+x) = 3.5(420-x)(420+x)$

$302400 - 720x + 302400 + 720x = 3.5(176400 - x^2)$

$604800 = 617400 - 3.5x^2$

$3.5x^2 = 12600$

$\sqrt{x^2} = \sqrt{3600}$

$x = \pm 60$

60 mph

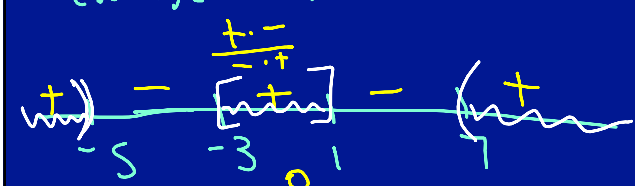
$$\frac{1}{x+5} \le \frac{x-2}{x-7}$$

$$0 \le \frac{(x+5)(x-2)}{(x+5)(x-7)} - \frac{1(x-7)}{(x+5)(x-7)}$$

$$0 \le \frac{x^2+3x-10-x+7}{(x-7)(x+5)}$$

$$0 \le \frac{x^2+2x-3}{(x-7)(x+5)}$$

$$\frac{(x+3)(x-1)}{(x-7)(x+5)} \ge 0 \quad +$$



$$(-\infty, -5) \cup [-3, 1] \cup (7, \infty)$$

1) Set < 0 OR > 0
2) Make common denom
3) Test points!

$$x\left[\frac{1}{x} < 2\right]$$

$1 < 2x \qquad 1 > 2x$

Never multiply an inequality by a variable!