

Trig 4.6

Solve rational equations
Solve rational inequalities
(Defer partial fractions)

$$\frac{1}{x+3} = \text{wavy}$$

<

rational

rational expression

$$\frac{x^2-1}{x+1} \quad \frac{(x-1)(\cancel{x+1})}{\cancel{x+1}}$$

rational equation

zeros (of a function)

$$\frac{x^2-1}{\cancel{x+1}} = \frac{2}{\cancel{x-3}}$$

excluded value

can't be used

interval

wavy \longleftrightarrow wavy

test point

T F

- Equations:
1. clear denominators
 2. solve
 3. check solutions (why?)

$$\frac{12}{t} + t - 8 = 0$$

$$12 + t^2 - 8t = 0$$

$$12. \frac{12}{t} + t - 8 = 0$$

$$t^2 - 8t + 12 = 0$$

$$(t-6)(t-2) = 0$$

$$\begin{array}{cc} \downarrow & \downarrow \\ t-6=0 & t-2=0 \\ t=6 & t=2 \end{array}$$

$$\begin{array}{l} x=2 \\ x=6 \end{array}$$

$$13. \frac{1}{m} = \frac{m-34}{2m^2}$$

↑ ↑

$$\frac{1}{-34} = \frac{-34-34}{2(-34)^2}$$
$$\frac{1}{-34} = \frac{-68}{2312}$$

$$\frac{\cancel{2m^2}}{m} = \frac{\cancel{2m}(m-34)}{\cancel{2m^2}}$$

$$\frac{2m}{-m} = \frac{m-34}{-m}$$
$$m = -34$$

$$\frac{2}{-1} + \frac{3}{-3} = \frac{-3}{-1}$$

$$14. \frac{2-2+1-3}{-3+2} + \frac{3}{y} = \frac{-y}{-3+2}$$

$$2y + 3(y+2) = -y-y$$

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

$$y^2 + 5y + 6 = 0$$

$$\begin{array}{r} 3 \times 2 \\ \hline 6 \\ \hline 5 \end{array}$$

$$(y+3)(y+2) = 0$$

$$y = -3$$

~~(n+1)(n-1)~~ ~~(n+1)(n-1)~~ ~~(n+1)(n-1)~~ (maybe)
 Factor to clear denoms.

$$15. \frac{10}{n^2-1} + \frac{2n-5}{n-1} = \frac{2n+5}{n+1}$$

FOIL

$$10 + (n+1)(2n-5) = (2n+5)(n-1)$$

$$10 + 2n^2 + 2n - 5n - 5 = 2n^2 - 2n + 5n - 5$$

$$\cancel{2n^2} - 3n + 5 = \cancel{2n^2} + 3n - 5$$

$$\cancel{-2n^2} - 3n - 5 \quad \cancel{-2n^2} - 3n - 5$$

$$\frac{-6n}{-6} = \frac{-10}{-6} \quad n = \frac{5}{3}$$

2 Solve $a + \frac{a^2 - 5}{a^2 - 1} = \frac{a^2 + a + 2}{a + 1} \cdot \frac{14}{4}$ $a = 3$

$(a+1)(a-1) \cdot 3 + \frac{1}{2} = \frac{7}{2} \cdot \frac{14}{4}$
 $\frac{a}{1} + \frac{(a^2 - 5)}{(a+1)(a-1)} = \frac{a^2 + a + 2}{a+1} \cdot \frac{(a+1)(a-1)}{(a+1)(a-1)}$

$a(a^2 - 1) + (a^2 - 5) = (a - 1)(a^2 + a + 2)$

$a^3 - a + a^2 - 5 = a^3 + a - 2$

$a^2 - 2a - 3 = 0$

$(a - 3)(a + 1) = 0$

$a = 3 \quad a = -1$

$\begin{array}{r} -3 \\ -5 \\ \hline -2 \end{array}$

$\frac{a^2 + a + 2}{a - 1}$
 $\frac{a^3 - a^2 - a - 2}{a^3 + a - 2}$

Solve inequalities (**Zone defense**)

- find excluded values (denom =0)
- find zeros (use equation)
- test intervals (pos or neg)
- Answer the question

13-21 all

$$9.5 + \frac{1}{x} > \frac{16}{x}$$

$$10. 1 + \frac{5}{a-1} \leq \frac{7}{6}$$

29. $\frac{(x-3)(x-4)}{(x-5)(x-6)^2} \leq 0$