P.22

Solving Rational Equations

How to Solve Rational Equations

1. Factor each denominator as needed and state the excluded values. (E.V. (set denom. = 0!))
2. Find a common denominator of each term in the equation.
3. Multiply each term by the common denominator
4. Simplify as needed and solve for the variable.
5. Check your answers to make sure they are not excluded values for the equation.

Example 1: $\left(\frac{y}{5}+\frac{y}{2}=\frac{7}{1}\right)\frac{10}{1}$ E.V none

LCD: 10

$\frac{10y}{5}+\frac{10y}{2}=\frac{70}{1}$

$2y+5y=70$

$\frac{7y}{7}=\frac{70}{7}$

$y=10$

Example 2: $\left(\frac{3x-2}{12}-\frac{1}{6}=\frac{1}{6}\right)\frac{12}{1}$ E.V. none

LCD: 12

$\frac{12(3x-2)}{12}-\frac{12}{6}=\frac{12}{6}$

$3x-2-2=2$

$3x-4=2$

$+4 \quad +4$

$\frac{3x}{3}=\frac{6}{3}$

$x=2$

$x\neq 0$

Example 3: $\left(\frac{11}{3x}-\frac{1}{3}=\frac{-4}{x^2}\right)\frac{3x^2}{1}$ E.V. $x\neq 0$

LCD: $3x^2$

$\frac{33x^2}{3x}-\frac{3x^2}{3}=\frac{-12x^2}{x^2}$

$11x-x^2=-12 \quad -11x+x^2$

$-11x \quad +x^2$

$0=x^2-11x-12$

$0=(x+1)(x-12)$

$3x=0 \quad x^2=0$

$x=0 \quad x=0$

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

$x-12=0 \quad x=12$

Example 4: $\left(\frac{5}{2x}=\frac{1}{x}+\frac{11}{6}\right)\frac{6x}{1}$ E.V. $2x=0$

LCD: $6x$

simplify!

$\frac{30x}{2x}=\frac{6x}{x}+\frac{66x}{6}$

$15=6+11x$

$-6 \quad -6$

$\frac{9}{11}=\frac{11x}{11}$

$x=\frac{9}{11}$

~~**Example 5:**~~ $x+\frac{6}{x}=-5$

~~**Example 6:**~~ $\frac{5x-2}{x-4}=-3$

Example 7: $\frac{-2}{x^2-2}=\frac{2}{x-4}$

Example 8: $\frac{3}{1-x}=\frac{2}{1+x}$

Example 9: $\frac{3}{x^2+3x}+\frac{x+2}{x+3}=\frac{1}{x}$

LCD: $x(x+3)$

$x(x+3)$

E.V.

$x\neq 0$

$x+3=0$

$x\neq -3$

$\frac{3x(x+3)}{x(x+3)}+\frac{x(x+2)(x+3)}{x+3}=\frac{x(x+3)}{x}$

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

$3+x^2+2x=x+3$

$-3 \quad -x \quad -x-3$

$x^2+x=0$

$x(x+1)=0$

$x=0,-1$

Example 10: $\frac{x+2}{2x+1}=\frac{x}{3}+\frac{3}{4x+2}$

LCD: $6(2x+1)$

$2(2x+1)$

E.V. $x\neq -\frac{1}{2}$

$2x+1=0$

$-1 \quad -1$

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

Example 11: $\frac{3}{x-6}-\frac{1}{x-2}=\frac{3}{1}$

E.V.

Example 12: $\frac{6}{y^2+2y}-\frac{y+1}{y+2}=\frac{2}{y}$

E.V.

(10) $\left(\frac{x+2}{2x+1} = \frac{x}{3} + \frac{3}{2(2x+1)}\right) \frac{6(2x+1)}{1}$

$$\frac{6(2x+1)(x+2)}{2x+1} = \frac{6x(2x+1)}{3} + \frac{18(2x+1)}{2(2x+1)}$$

$$6(x+2) = 2x(2x+1) + 9$$

$$6x + 12 = 4x^2 + 2x + 9$$

$$-6x \quad -12 \qquad -6x \quad -12$$

$$0 = 4x^2 - 4x - 3 = (2x-3)(2x+1)$$

$$x = 3/2, \; -1/2$$

P.24

Day 6 Homework OMIT. 3-6

Solve the following. State all excluded values.

1) $\frac{5}{x}+\frac{3}{2}=\frac{7}{2x}$ EV: $x\neq 0$ LCD: $2x$

$\frac{10x}{x}+\frac{6x}{2}=\frac{14x}{2x}$

$10+3x=7$

$3x=-3$

$x=-1$

2) $\frac{3}{2a}+\frac{5}{6}=2$ $2a=0$ EV. $a\neq 0$

$a=9/7$

~~3)~~ $\frac{6}{2y}=\frac{4}{3y+2}$

~~4)~~ $\frac{7}{y+2}=\frac{6}{y-5}$

~~5)~~ $n+2=\frac{4}{n-2}$

~~6)~~ $\frac{a-1}{a+5}=\frac{a}{2a+10}$

7) $\frac{3}{5x}+1=\frac{6}{x}$

8) $\frac{x-5}{9}+\frac{2x+1}{6}=\frac{3x-4}{4}$

$p=\frac{24}{9}=\frac{8}{3}$ $p-2=0$ EV. $p\neq 2$

9) $\left(\frac{p}{p-2}+\frac{4}{p-2}=\frac{10}{1}\right)\frac{(p-2)}{1}$

$\frac{p(p-2)}{p-2}+\frac{4(p-2)}{p-2}=10(p-2)$

$p+4=10p-20$

$24=9p$

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

7) $\frac{a}{a-1}-1=\frac{a}{2}$

8) $\frac{4}{x^2-2x-3}=\frac{x}{x-3}-\frac{1}{x+1}$ LCD: $(x+1)(x-3)$

$\frac{(x-3)(x+1)}{1}\left(\frac{4}{(x+1)(x-3)}=\frac{x}{x-3}-\frac{1}{x+1}\right)$ EV. $x\neq 3,-1$

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

$4=x^2+x-x+3$

$4=x^2+3$ $x^2=1$

$x=1,-1$

9) $\frac{9}{28}+\frac{3}{z+2}=\frac{3}{4}$

P. 25-26 #1-10

10) $\frac{1}{x-3}+\frac{2}{x^2-9}=\frac{5}{x+3}$

11) $\frac{b-4}{b-2}=\frac{b-2}{b+2}+\frac{1}{b-2}$

12) $\frac{3}{b^2+5b+6}+\frac{b-1}{b+2}=\frac{7}{b+3}$