

Questions from Homework

Solving Rational Equations

Solve for x

$$\text{LCD} = (x-2)(x+2)$$

$$\frac{x+6}{x^2-4} = \frac{2}{x-2} + \frac{x}{x+2}$$

$$\frac{\cancel{(x-2)}\cancel{(x+2)}(x+6)}{\cancel{(x-2)}\cancel{(x+2)}} = \frac{\cancel{(x-2)}\cancel{(x+2)}2}{\cancel{x-2}} + \frac{\cancel{(x-2)}\cancel{(x+2)}x}{\cancel{x+2}}$$

$$x+6 = 2(x+2) + x(x-2)$$

$$x+6 = \cancel{2x}+4 + x^2 - \cancel{2x}$$

$$0 = x^2 - x - 2 \quad \begin{matrix} -2x + 1 = -2 \\ -2 + 1 = -1 \end{matrix}$$

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

$$\begin{array}{l|l} x-2=0 & x+1=0 \\ x=2 & x=-1 \end{array}$$

Test Solutions:

$$\frac{x+6}{x^2-4} = \frac{2}{x-2} + \frac{x}{x+2}$$

$$\frac{8}{0} = \frac{2}{0} + \frac{2}{4}$$

$x=2$ is not a solution

$$\frac{x+6}{x^2-4} = \frac{2}{x-2} + \frac{x}{x+2}$$

$$\frac{5}{-3} = \frac{2}{-3} + \frac{-1}{1}$$

$$-\frac{5}{3} = -\frac{2}{3} - \frac{3}{3}$$

$$-\frac{5}{3} = -\frac{5}{3}$$

$x=-1$ is a solution

Solving Irrational Equations

Solve for x

$$(\sqrt{2x+7})^2 = (x-4)^2$$

$$2x+7 = x^2 - 8x + 16$$

$$0 = x^2 - 10x + 9$$

$$0 = (x-9)(x-1)$$

$$\begin{array}{l|l} x-9=0 & x-1=0 \\ \hline x=9 & x=1 \end{array}$$

$$\begin{array}{l} -9x - 1 = 9 \\ -9 + -1 = -10 \end{array}$$

Test your Solutions:

$$x=9$$

$$\sqrt{2x+7} = x-4$$

$$\sqrt{25} = 9-4$$

$$5 = 5$$

$x=9$ is a solution

$$x=1$$

$$\sqrt{2x+7} = x-4$$

$$\sqrt{9} = 1-4$$

$$3 \neq -3$$

$x=1$ is not a solution
it is an extraneous
root

Solving Irrational Equations

Solve for x

$$(\sqrt{3x-5})^2 = (3 + \sqrt{x-2})^2$$

$$3x-5 = 9 + 6\sqrt{x-2} + x-2$$

$$3x-5 = 7 + 6\sqrt{x-2} + x$$

$$2x-12 = 6\sqrt{x-2}$$

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

$$(x-6)^2 = (3\sqrt{x-2})^2$$

$$x^2 - 12x + 36 = 9(x-2)$$

$$x^2 - 12x + 36 = 9x - 18$$

$$x^2 - 21x + 54 = 0$$

$$\begin{aligned} -18x - 3 &= 54 \\ -18 + -3 &= -21 \end{aligned}$$

$$(x-18)(x-3) = 0$$

$$\begin{array}{l|l} x-18=0 & x-3=0 \\ x=18 & x=3 \end{array}$$

Test your solutions

$$x=18 \quad \sqrt{3x-5} = 3 + \sqrt{x-2}$$

$$\sqrt{54-5} = 3 + \sqrt{18-2}$$

$$\sqrt{49} = 3 + \sqrt{16}$$

$$7 = 3 + 4$$

$$7 = 7$$

$x=18$ is a solution

$$x=3 \quad \sqrt{3x-5} = 3 + \sqrt{x-2}$$

$$\sqrt{9-5} = 3 + \sqrt{3-2}$$

$$\sqrt{4} = 3 + \sqrt{1}$$

$$2 = 3 + 1$$

$$2 \neq 4$$

Not a solution

Homework