

Algebra 2  
Solving Rational Equations - HW - Part 2

Name KEY  
Date: \_\_\_\_\_ Period: \_\_\_\_\_

Solve each equation. Check your answers.

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

$$\frac{1}{2x} = \frac{12}{2x} + \frac{x}{2x}$$

$$1 = 12 + x$$

$$\boxed{-11 = x}$$

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

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

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

$$1 = 6 + x$$

$$\boxed{-5 = x}$$

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

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

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

$$3 = 1 + 6x - 6$$

$$3 = 6x - 5$$

$$8 = 6x$$

$$\boxed{x = 4/3}$$

$$4) 1 = \frac{1}{x^2} + \frac{4x^2 + 20x - 24}{x^2}$$

$$\frac{x^2}{x^2} = \frac{1}{x^2} + \frac{4x^2 + 20x - 24}{x^2}$$

$$x^2 = 1 + 4x^2 + 20x - 24$$

$$0 = 3x^2 + 20x - 23$$

$$0 = 3x^2 + 23x - 3x - 23$$

$$0 = (3x^2 + 23x) + (-3x - 23)$$

$$0 = x(3x + 23) - 1(3x + 23)$$

$$0 = (3x + 23)(x - 1)$$

$$3x + 23 = 0 \quad x - 1 = 0$$

$$\boxed{x = -23/3}$$

$$\boxed{x = 1}$$

~~$\frac{-69}{23} = -3$~~

$$5) \frac{x+1}{x-3} = 4 - \frac{12}{x^2-2x-3}$$

$$\frac{x+1}{(x-3)} = \frac{4}{1} - \frac{12}{(x-3)(x+1)}$$

$$\frac{(x+1)(x+1)}{(x-3)(x+1)} = \frac{4(x-3)(x+1)}{(x-3)(x+1)} - \frac{12}{(x-3)(x+1)}$$

$$x^2+2x+1 = 4(x^2-2x-3) - 12$$

$$x^2+2x+1 = 4x^2-8x-12-12$$

$$0 = 3x^2 - 10x - 25 \quad \begin{array}{r} -75 \\ -15 \times 5 \\ -10 \end{array}$$

$$0 = 3x^2 - 15x + 5x - 25$$

$$0 = (3x^2 - 15x) + (5x - 25)$$

$$0 = 3x(x-5) + 5(x-5)$$

$$0 = (x-5)(3x+5)$$

$$x-5=0 \quad 3x+5=0$$

$$\boxed{x=5}$$

$$\boxed{x=-5/3}$$

$$6) \frac{3}{x} + \frac{1}{x^3} = \frac{3x^2-2x-5}{x^3}$$

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

$$3x^2 + 1 = 3x^2 - 2x - 5$$

$$1 = -2x - 5$$

$$6 = -2x$$

$$\boxed{-3 = x}$$

$$7) \frac{x+5}{3x^2} = \frac{5}{3x} + \frac{x^2-4x+3}{x^2}$$

$$\frac{x+5}{3x^2} = \frac{5x}{3x^2} + \frac{3(x^2-4x+3)}{3x^2}$$

$$x+5 = 5x + 3x^2 - 12x + 9$$

$$0 = 3x^2 - 8x + 4 \quad \begin{array}{r} 12 \\ -6 \times -2 \\ -8 \end{array}$$

$$0 = 3x^2 - 6x - 2x + 4$$

$$0 = (3x^2 - 6x) + (-2x + 4)$$

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

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

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

$$\boxed{x=2}$$

$$\boxed{x=2/3}$$

$$8) \frac{x-3}{x} = \frac{1}{x+1} + \frac{1}{x^2+x}$$

$$\frac{x-3}{x} = \frac{1}{x+1} + \frac{1}{x(x+1)}$$

$$\frac{(x-3)(x+1)}{x(x+1)} = \frac{x}{x(x+1)} + \frac{1}{x(x+1)}$$

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

$$x^2-3x-4=0$$

$$(x-4)(x+1)=0$$

$$x-4=0 \quad x+1=0$$

$$\boxed{x=4}$$

$$x=-1$$

EXTRANEAS

$$\begin{array}{r} -4 \\ -4 \times 1 \\ -3 \end{array}$$