

**Extraneous Solutions:**

When you multiply or divide an equation by an expression containing variables, the resulting equation may have solutions that are not solutions of the original equation

$x = -5$   
 $-2 = -2$

$x = \frac{17 \pm \sqrt{289 - 4(2)(20)}}{4}$   
 $x = \frac{17 \pm \sqrt{289 - 160}}{4}$   
 $x = \frac{17 \pm \sqrt{129}}{4}$

Solve the equation algebraically. Check for extraneous solutions.

$-\frac{2}{4} + \frac{5}{4}$   
 A)  $\frac{x-5}{4} + \frac{x+2}{4} = \frac{3}{4}$   
 $(4) \frac{x-5}{4} + \frac{x+2}{4} = \frac{3}{4} (4)$   
 $x-5 + x+2 = 3$   
 $2x-3 = 3$   
 $\frac{2x-3}{+3} = \frac{3}{+3}$   
 $2x = 6$   
 $\frac{2x}{2} = \frac{6}{2}$   
 $x = 3$

B)  $x + 3 = \frac{10}{x}$

$(x) x + 3(x) = \frac{10(x)}{x}$   
 $x^2 + 3x = 10$   
 $\frac{-10 \quad -10}{x^2 + 3x - 10 = 0}$

$(x+5)(x-2) = 0$   
 $x = -5$   $x = 2$

C)  $\frac{3(x)}{(x-2)(x)} + \frac{10(x-2)}{x(x-2)} = \frac{2x(x-2)}{x(x-2)}$   
 $3x + 10(x-2) = 2x(x-2)$   
 $3x + 10x - 20 = 2x^2 - 4x$   
 $13x - 20 = 2x^2 - 4x$   
 $\frac{-13x + 20 \quad -13x + 20}{0 = 2x^2 - 17x + 20}$   
 $0 = (2x - \quad)(x - \quad)$

$$\frac{\cancel{x(x-2)} \cdot 3}{x-2} + \frac{10 \cancel{(x-2)}}{\cancel{x}} = 2(x)(x-2)$$

$$3x + 10(x-2) = 2(x)(x-2)$$

Solve the equation algebraically. Check for extraneous solutions.

$$x \neq 1$$

$$x \neq 3$$

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

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

$$2x^2 - 6x + x - 1 = 2$$

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

$$\frac{-2 \quad -2}{2x^2 - 5x - 3 = 0}$$

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

$$2x+1=0$$

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

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

$$\cancel{x=3}$$

$$x \neq 0$$

$$x \neq -2$$

B)  $\frac{x-3}{x} + \frac{3}{x+2} + \frac{6}{x^2+2x} = 0$  NO SOLUTION

$$\frac{(x+2)(x-3)}{(x+2)x} + \frac{3(x)}{(x+2)(x)} + \frac{6}{x(x+2)} = 0$$

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

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

$$x^2 + 2x = 0$$

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

$$x=0 \quad x=-2 \quad \text{Both Extraneous}$$

$$x^2 - 5 = 0$$

$$x = \pm\sqrt{5}$$

Solve the equation

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

$$x^2 - 4x + 3 = 3x^2 - 15$$
$$-x^2 + 4x - 3 \quad -x^2 - 3 + 4x$$

$$0 = \frac{2x^2 + 4x - 18}{2}$$

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

$$x = \frac{-2 \pm \sqrt{4 - 4(1)(-9)}}{2}$$

$$x = -1 \pm \frac{\sqrt{40}}{2}$$

$$\text{B) } x^3 + \frac{2}{x} = 3$$

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

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

See where they intersect

$$x = 1$$

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

Look for x-intercept

Calculator