

Solving Rational Equations - You may check your answers using a LRSRS Chart if you wish.

$$1. \frac{1}{6a} + \frac{1}{3a^2} = \frac{1}{a} \quad | \quad \text{LCD: } 6a^2$$

$$\frac{1}{6a} + \frac{2}{6a^2} = \frac{6a}{6a^2}$$

$$\frac{1}{6a} + \frac{2}{6a^2} = \frac{6a}{6a^2}$$

$$1 + 2 = 6a$$

$$3 = 6a$$

$$-3 = -6a$$

$$\frac{1}{2} = a$$

The solution is $a = \frac{1}{2}$.

$$2. \frac{4}{y-4} - \frac{3}{y-2} = 1 \quad | \quad \text{LCD: } (y-4)(y-2)$$

$$\frac{4(y-2) - 3(y-4) + (y-4)(y-2)}{(y-4)(y-2)} = \frac{y-4}{(y-4)(y-2)}$$

$$4(y-2) - 3(y-4) + (y-4)(y-2) = y-4$$

$$4y - 8 - 3y + 12 + y^2 - 6y + 8 = y - 4$$

$$y^2 - 2y + 12 = y - 4$$

$$y^2 - 3y + 16 = 0$$

$$y = 6, y = 2$$

The solutions are $y = 6$ and $y = 2$.

$$3. \frac{r+5}{r^2-3r} - 1 = \frac{1}{r} \quad | \quad \text{LCD: } r(r-3)$$

$$\frac{r+5}{r(r-3)} - \frac{r(r-3)}{r(r-3)} = \frac{1}{r}$$

$$\frac{r+5 - r(r-3)}{r(r-3)} = \frac{1}{r}$$

$$r+5 - r(r-3) = r-3$$

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

$$-r^2 + 4r + 8 = r - 3$$

$$-r^2 + 3r + 11 = 0$$

$$r = 4, r = -1$$

The solutions are $r = 4$ and $r = -1$.

$$4. \frac{2}{x+1} - \frac{3}{x} = \frac{1}{x^2+x} \quad | \quad \text{LCD: } x(x+1)$$

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

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

$$2x - 3x - 3 = 1$$

$$-x - 3 = 1$$

$$-x = 4$$

$$x = -4$$

The solution is $x = -4$.

$$5. \frac{5}{x^2+3x+2} + \frac{2}{x-2} = \frac{6}{x-4} \quad | \quad \text{LCD: } (x-2)(x-4)$$

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

$$5(x-2)(x-4) + 2(x-4) = 6(x-2)$$

$$5x^2 - 24x + 20 + 2x - 8 = 6x - 12$$

$$5x^2 - 22x + 12 = 6x - 12$$

$$5x^2 - 28x + 24 = 0$$

$$x = 4, x = \frac{6}{5}$$

Note: $x = 4$ is a nrv. Therefore, there is no solution.

$$6. \frac{y+5}{x^2+x} - \frac{1}{x^2+x} = \frac{y-6}{x+1} \quad | \quad \text{LCD: } x(x+1)$$

$$\frac{y+5}{x(x+1)} - \frac{1}{x(x+1)} = \frac{y-6}{x+1}$$

$$\frac{y+5-1}{x(x+1)} = \frac{y-6}{x+1}$$

$$\frac{y+4}{x(x+1)} = \frac{y-6}{x+1}$$

$$y+4 = x(y-6)$$

$$y+4 = xy-6x$$

$$y - xy = -6x - 4$$

$$y(1-x) = -6x - 4$$

$$y = \frac{-6x-4}{1-x}$$

The solutions are $x = 4$ and $x = 1$.

$$7. \frac{x}{5x+5} - \frac{1}{x+2} = \frac{1}{x^2+3x+2} \quad | \quad \text{LCD: } 5(x+1)(x+2)$$

$$\frac{x}{5(x+1)} - \frac{1}{x+2} = \frac{1}{(x+1)(x+2)}$$

$$\frac{x(x+2) - 5(x+1)}{5(x+1)(x+2)} = \frac{1}{(x+1)(x+2)}$$

$$x(x+2) - 5(x+1) = 5$$

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

$$x^2 - 3x - 10 = 0$$

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

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

Note: $x = -2$ is a nrv. Therefore, the solution is $x = 5$.