Solving Rational Equations Part 2

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A. Definitions

    1) **rational equation:** an mathematical equation that contains rational expressions.

    2) **extraneous root:** a solution to a rational equation that when checked does not satisfy the original equation.

B. Solving Rational Equations

a) $x^2 \left[3 + \dfrac{1}{x} = \dfrac{4}{x^2} \right]$ $\underline{X \neq 0}$

$3x^2 + x = \cancel{4}$
    $-4 \quad -4$

-12

$4 \diagtimes -3$
    1

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

$\left(x + \dfrac{4}{③} \right)\left(x - \dfrac{3}{3} \right) = 0$

$\left(3x + 4 \right)\left(x - 1 \right) = 0$

$\boxed{X = -\dfrac{4}{3}, \ 1}$

$(x-3)(x-2)$

b) $\left[\dfrac{x+2}{x-3} = \dfrac{x-1}{x-2}\right]$ $X \neq 3, 2$

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

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

$$\cancel{x^2} - 4 = \cancel{x^2} - 4x + 3$$

$$\begin{array}{r} -4 = -4x + 3 \\ -3 \qquad\quad -3 \end{array}$$

$$\dfrac{-7}{-4} = \dfrac{-4x}{4}$$

$$\boxed{X = \dfrac{7}{4}}$$

c) $\dfrac{3x+1}{x^2-1} = \dfrac{-x}{x+1}$ $X \neq -1, 1$

$(x+1)(x-1)\left[\dfrac{3x+1}{(x+1)(x-1)} = \dfrac{-x}{x+1}\right]$

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

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

$$x^2 + 2x + 1 = 0$$

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

$$X = -1$$
Extraneous Root

$$\boxed{No\ Solution}$$

d) $\dfrac{x}{x-3} = \dfrac{-6}{x^2-8x+15}$

$x \neq 3, 5$

15
-5 ╳ -3 $(x-3)(x-5)$
-8

$\left[\dfrac{x}{x-3} = \dfrac{-6}{(x-5)(x-3)} \right]$

$x(x-5) = -6$

$x^2 - 5x = -6$
$ {}_{+6} \quad {}^{+6}$

6
-3 ╳ -2
-5

$x^2 - 5x + 6 = 0$

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

$x = \cancel{3}, 2$

Extraneous
Root.

$\boxed{x = 2}$

Assignment: Pg. 583 #6, 7, 9, 10