RATIONAL EQUATIONS

Domain restrictions

Values that make any denominator zero are excluded before the equation is touched.

DOMAIN

all real numbers minus the excluded values

HOLDS WHEN no denominator in the original equation equals zero

✓ Candidates for solutions

Any value that keeps every denominator nonzero

Only candidates that survive within the domain qualify as solutions.

BOUNDARY

✗ Never solutions

$x = 3$ in $\dfrac{x}{x-3} = \dfrac{9}{x-3} + 2$

The denominator $x - 3$ is zero there, whatever the later algebra suggests.

$x = 0$ and $x = 2$ in $\dfrac{1}{x} + \dfrac{1}{x-2} = \dfrac{5}{x(x-2)}$

Each denominator contributes its own restriction.

FACTOR FIRST $x^2 - 4$ A denominator may hide restrictions: $x^2 - 4 = (x-2)(x+2)$ excludes both $x = 2$ and $x = -2$.