6.1: Simplifying Rational Expressions

Rational Expressions: an algebraic fraction where the numerator and denominator are polynomials.

ex. $\frac{3x-6}{2x^2+x-3}$

Non-permissible values

Because we can't divide by zero, any values of x in the denominator that makes it zero, are non-permissible.

exs)

1. $\frac{x+3}{x-2}$

$x-2 \neq 0$

$x \neq 2$

2. $\frac{2x+6}{x(x+6)}$

$x(x+6) \neq 0$

$x \neq 0 \quad \{ \quad x \neq -6$

3. $\frac{5x}{x^2+5x+6}$

$(x+2)(x+3) \neq 0$

$x \neq -2 \quad \{ \quad x \neq -3$

Simplifying

1. $\dfrac{3x-6}{2x^2+x-10}$

Factor first!

$\dfrac{3(x-2)}{(2x+5)(x-2)}$

List non-permissible values.

$(2x+5)(x-2) \neq 0$

$x \neq -\frac{5}{2} \quad x \neq 2$

$2x^2+x-10$

add 1
mult -20
5 and -4

$(2x^2-4x)(+5x-10)$

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

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

Cross off common factors

$\dfrac{3(x-2)}{(2x+5)(x-2)} = \dfrac{3}{(2x+5)}$

2. $\dfrac{1-t}{t^2-1}$

$\dfrac{1-t}{(t+1)(t-1)}$

$t \neq \pm 1$

$\dfrac{-t+1}{(t+1)(t-1)} \quad \dfrac{-1(t-1)}{(t+1)(t-1)}$

$= \dfrac{-1}{t+1}$