

5.1: Simplify Rational Expressions

Steps:

- 1) Factor
- 2) Replace expressions with their factors
- 3) cancel factors
- 4) write factors that are left

Ex 1) $\frac{2x-8}{x^2-6x+8}$

$\frac{2x-8}{2} \frac{1}{2}$
 $2(x-4)$

GCF: 2

$x^2 + 6x + 8$
 $x^2 - 2x \quad -4x + 8$
 $\frac{x}{x} \quad \frac{-2x}{x} \quad \frac{-4x}{-4} \quad \frac{8}{-4}$
 $x(x-2) \quad -4(x-2)$
 $(x-2)(x-4)$

$\frac{8x^2}{-2x} + \frac{-4x}{-4} = -6x$

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

Ex 2) $\frac{x^2+3x-28}{x^2-49} = \frac{(x+7)(x-4)}{(x+7)(x-7)} = \frac{x-4}{x-7}$

$x^2 + 3x - 28$
 $(x+7)(x-4)$

$\frac{-28}{1} + \frac{-4}{-4} = 3$
 $y = -28/x$

$x^2 - 49$
 $\sqrt{x^2} = x \quad \sqrt{49} = 7$
 $(x+7)(x-7)$

* only work w/ $\sqrt{x^2}$ *

You try: $\frac{x-1}{x^2-1} = \frac{x-1}{(x+1)(x-1)} = \boxed{\frac{1}{x+1}}$

$\sqrt{x^2} = x \quad \sqrt{1} = 1$
 $(x+1)(x-1)$

* anything that crosses out, makes a fancy 1!

Ex 3) $\frac{9x^2 + 81x}{3x^4 + 24x^3 - 27x^2} = \frac{3 \cdot 9x(x+9)}{3x^2(x+9)(x-1)} = \boxed{\frac{3}{x(x-1)}}$

$\frac{9x^2 + 81x}{9x} \quad \text{GCF: } 9x$

$9x(x+9)$

$\frac{3x^4 + 24x^3 - 27x^2}{3x^2} \quad \text{GCF: } 3x^2$

$3x^2(x^2 + 8x - 9)$

$3x^2(x+9)(x-1)$

$\begin{matrix} -9 \\ \wedge \\ 9 + -1 = 8 \end{matrix}$