2.4 Simplifying Rational Functions   Feb 26

$$y = \frac{f(x)}{g(x)}$$

Ex. Simplify each rational expression and state restrictions.

$$\frac{30x^4 y^3}{-6x^7 y} = \frac{\overset{5}{\cancel{30}} x^4 \overset{y^2}{\cancel{y^3}}}{\underset{1}{\cancel{-6}} \underset{x^3}{\cancel{x^7}} \cancel{y}}$$

NECESSARY

$$= \frac{5y^2}{-x^3} = -\frac{5y^2}{x^3} \quad , \quad x \neq 0 \; , \; y \neq 0$$

$$= -\frac{5y^2}{x^3} \; , \; y \neq 0$$

$$\frac{10x^4 - 8x^3 + 4x^2}{2x^2} \quad \longleftarrow \quad \text{COMMON FACTOR}$$

$$= \frac{\cancel{2x^2}(5x^2 - 4x + 2)}{\cancel{2x^2}}$$
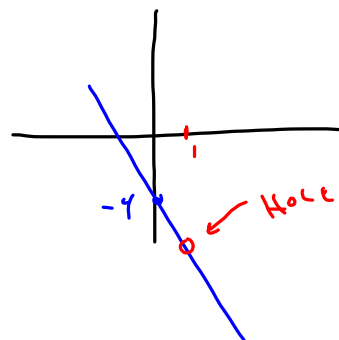
$$= 5x^2 - 4x + 2 \quad , \quad x \neq 0$$

HOLE
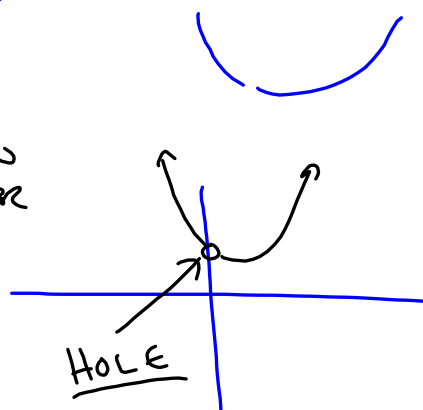
$$\frac{x^2 + 7x - 8}{2 - 2x} = \frac{(x + 8)(x - 1)}{-2(x - 1)}$$

$\hookrightarrow -2x + 2$

$$= \frac{x + 8}{-2} \quad , \quad x \neq 1$$

$$= -\frac{1}{2}x - 4 \quad , \quad x \neq 1$$

$-y$ 1   ← Hole

$$\frac{3x^3 - 3x^2}{8x^3 - 12x^2 + 4x}$$

$$= \frac{3x^2(x - 1)}{4x(2x^2 - 3x + 1)}$$

$$= \frac{3x^2(x - 1)}{4x(2x - 1)(x - 1)}$$

$$= \frac{3x}{4(2x - 1)} \quad , \quad x \neq 0, 1$$

ALSO $x \neq \frac{1}{2}$

$$\frac{4x^2 - 16y^2}{x^2 + xy - 6y^2} \longrightarrow \quad 4(x^2 - 4y^2)$$
$$4(x - 2y)(x + 2y)$$

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

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

$$= \frac{4(x + 2y)}{x + 3y} \quad , \quad x \neq 2y$$

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