What's Going On?

Checking In Homework Logs

Minds on Rated "R" for Undefined

Action! Factor, Restrict, Simplify

Consolidation Working Backwards

Learning Goal - I will be able to simplify rational functions and determine their restrictions.

Checking In

F.F.M.

Get your grid books.

Factor.

$$6x^{2} - 20 + 26x$$

$$6x^{2} + 26x - 20$$

$$= 2(3x^{2} + 13x - 10)$$

$$= 2(3x^{2} + 16x - 2x - 10)$$

$$= 2(3x^{2} - 2x + 16x - 10)$$

$$= 2(3x^{2} - 2x + 16x - 10)$$

$$= 2(x(3x-2) + 6(3x-2))$$

$$= 7(3x-2)(x+6)$$

Homework Log Reminder

Please remember the new approach to the "How Much I Did" column!

Minds on

First, A Few New Terms



A <u>rational function</u> is any function that is the ratio of two polynomials.

A rational function can be expressed as

$$f(x) = \frac{R(x)}{S(x)}$$
 where R and S are polynomials and $S \neq 0$.



A <u>rational expression</u> is a quotient of polynomials. All rational functions are also rational expressions.



<u>Restrictions</u> are all values of the variable(s) in a rational function or rational expression that cause the function to be undefined.

These are the zeros of the denominator or, equivalently, the numbers that are not in the domain of the function.

Minds on

Rated "R" for Undefined

State any restrictions on the independent variable in each given function.

$$f(x) = \frac{1}{x}; \quad \times \neq 0$$

$$g(x) = \frac{1}{(x-1)}$$
; $\times \neq 1$

$$h(x) = \frac{1}{2x+1}; \quad x \neq \frac{1}{2}$$

$$j(x) = \frac{-7}{3x - 2} ; \quad x \neq \frac{2}{3} \quad \begin{array}{c} 3x - 2 \neq 0 \\ 3x \neq 2 \\ x \neq \frac{2}{3} \end{array}$$

$$k(x) = \frac{-7}{x^2 - 9}$$
; $x \neq 3$, 3

$$m(x) = \frac{x^2 + 5x + 6}{x^2 - x - 12}$$

$$k(x) = \frac{-7}{x^{2} - 9}; x \neq 3, -3$$

$$x \neq \pm 3$$

$$x^{2} - 9 \neq 0$$

$$+9 + 9 \qquad (x + 3)(x - 3)$$

$$x \neq \sqrt{9}$$

$$x \neq \sqrt{9}$$

$$x \neq \sqrt{9}$$

$$m(x) = \frac{x^{2} + 5x + 6}{x^{2} - x - 12}$$

$$m(x) = \underbrace{(x + 5)(x + 2)}_{(x - 4)(x + 3)}$$

$$x \neq -3, 4$$

$$m(x) = \underbrace{x + 2}_{x - 4}, x \neq -3, 4$$

$$y \Rightarrow -3, 4$$

Both graphs are the same!

Factor, Restrict, Simplify

Simplify the rational function below and state any restrictions.

$$m(x) = \frac{x^2 + 5x + 6}{x^2 - x - 12}$$

SEE PREVIOUS SLIDE

Factor, Restrict, Simplify

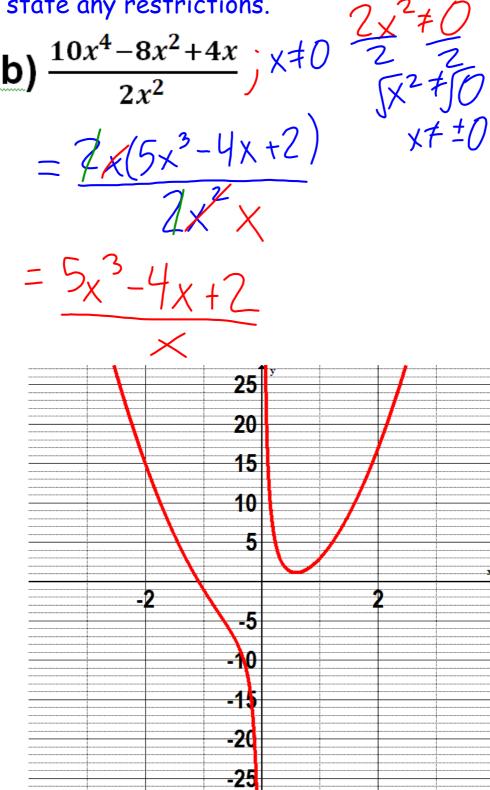
To simplify a rational function.

- 1. Factor
- 2. Note any restrictions
- 3. Divide by the GCF (simplify)
- 4. State restrictions

*Any restrictions that remain the fully simplified expression are ASYMPTOTES. Any restrictions that don't appear in the fully simplified expression are HOLES.

Factor, Restrict, Simplify

Factor, Restrict, Simplify



Factor, Restrict, Simplify

c)
$$\frac{x^2 + 7x - 8}{2 - 2x}$$
 $-2x + 2$ $-2(x - 1)$ $= \frac{(x - 1)(x + 8)}{2(1 - x)}$ $= \frac{(x - 1)(x + 8)}{-2(x - 1)}$ $= \frac{(x + 4)}{-2(x + 4)}$ or $\frac{-(x + 4)}{2}$ or $\frac{-(x + 4)}{2}$

Factor, Restrict, Simplify

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

e)
$$P(n) = \frac{3n^3 - 3n^2}{8n^3 - 12n^2 + 4n}$$

Factor, Restrict, Simplify

e)
$$P(n) = \frac{3n^3 - 3n^2}{8n^3 - 12n^2 + 4n}$$

Consolidation

Working Backwards

Create a rational expression with integer coefficients that simplifies to $\frac{2x+1}{x-4}$

with the following restrictions: $x \neq \frac{2}{3},4$

Consolidation

Homework!

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