

11.4 Simplifying Rational Expressions

Assignment:

~~3/4~~
~~1/7~~
~~√4~~

rational number: any # that can be written as a fraction $\frac{a}{b}$; $b \neq 0$

rational expression: fraction w/ an expression in the numerator and an exp. in the denominator

simplified expression: Rat. Exp. that do not have a common factor other than 1.

Examples

1. For what values of the variable is the rational expression undefined?

a. $\frac{w}{x^2 - 4} = 0$
 $x^2 - 4 = 0$
 $x = 2$

Domain: $D = \{ \mathbb{R}; x \neq 2 \}$

b. $\frac{w}{x^2 - 4x + 3} = 0$
 $(x-3)(x-1) = 0$
 $x = 3$ $x = 1$

$D = \{ \mathbb{R}; x \neq 3, 1 \}$

2. Simplify.

a. $\frac{7x}{42} = \frac{\cancel{7} \cdot x}{\cancel{7} \cdot 6} = \frac{x}{6}$

b. $\frac{4x^4}{18x^2} = \frac{\cancel{2} \cdot \cancel{2} \cdot x^4}{\cancel{2} \cdot \cancel{3} \cdot 3 \cdot x^2} = \frac{2x^2}{9}$

$\frac{\cancel{2} \cdot \cancel{2} \cdot x^4}{\cancel{2} \cdot \cancel{3} \cdot \cancel{3} \cdot x^2} = \frac{2x^2}{9}$

11.5 Multiplying and Dividing Rational Expressions

Assignment:

To multiply rational expressions:

- * Factor (11.4)
- * Simplify (11.4)
- * "Mut"
- * Simp. (if needed)

To divide rational expressions:

- * Take the reciprocal of the right exp.
- * See mult. rat. exp.

Examples

1. Multiply and simplify.

$$a. \frac{14n^5}{15n^2} \cdot \frac{18n^3}{4n} = \frac{14 \cdot 18 \cdot n^5 \cdot n^3}{15 \cdot 4 \cdot n^2 \cdot n} = \frac{252n^8}{60n^3} = \frac{21n^5}{5}$$

$$b. \frac{y(y-5)}{(3y-3y^2)} \cdot \frac{2y}{y^2-6y+5}$$

$\frac{2y}{5(1-y)(y-1)}$
 $\frac{2y}{-5(y-1)^2}$

$$c. \frac{(2x+1)}{(2x^2-x-3)} \cdot \frac{1}{(x-3)}$$

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

2. Divide and simplify.

$$\begin{aligned} \text{a. } & \frac{2x}{5} \div \frac{6x^2}{10} \\ & \frac{2x}{5} \times \frac{10}{6x^2} = \frac{2}{3x} \end{aligned}$$

$$\begin{aligned} \text{b. } & \frac{n-2}{2n} \div \frac{n-2}{n+5} \\ & \frac{(n-2)}{2n} \times \frac{(n+5)}{(n-2)} \\ & \frac{n+5}{2n} \end{aligned}$$

$$\begin{aligned} \text{c. } & \frac{5x^2-20x}{x+5} \div \frac{(x-4)}{1} \\ & \frac{5x^2-20x}{x+5} \times \frac{1}{x-4} \\ & \frac{5x}{x+5} \end{aligned}$$

$$\begin{aligned} \text{d. } & \frac{8x}{x^2+4x+4} \div \frac{2x^3}{x+2} \\ & \frac{4x}{(x+2)(x+2)} \times \frac{x+2}{2x^3} = \frac{4}{x(x+2)} \end{aligned}$$