11.1 Simplifying Rational Expressions

Monomials and Binomials

Simplifying Rational Expressions

1. Factor
2. Reduce
   coefficients
3. Eliminate
   common factors
4. Determine
   restrictions

EX 1 Simplify

$$\frac{21a^2}{7a^3}$$

$$\frac{3}{a} \quad a \neq 0$$

1. Factor
2. Reduce
3. Eliminate
4. Determine
   restrictions

EX 2 Simplify

$$\frac{18d^2}{4d+8}$$

$$\frac{18d^2}{4(d+2)}$$

$$\frac{9d^2}{2(d+2)}$$

$$\frac{9d^2}{2d+4} \quad d \neq -2$$

1. Factor
2. Reduce
3. Eliminate
4. Determine
   restrictions

EX 3 Simplify

$$\frac{26x^3+91x}{2x^2+7}$$

$$\frac{13x(2x^2+7)}{2x^2+7}$$

$$\frac{13x}{1}$$

$$13x \quad \text{none}$$

1. Factor
2. Reduce
3. Eliminate
4. Determine
   restrictions

EX 4 Simplify

$$\frac{2n-3}{6n-9}$$

$$\frac{2n-3}{3(2n-3)}$$

$$\frac{1}{3} \quad n \neq \frac{3}{2}$$

1. Factor
2. Reduce
3. Eliminate
4. Determine
   restrictions

EX 5 Simplify

$$\frac{2x-8}{x^2-2x-8}$$

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

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

EX 6 Simplify

$$\frac{2x^2+17x-9}{x^2-81}$$

$$\frac{(2x-1)(x+9)}{(x-9)(x+9)}$$

$$\frac{2x-1}{x-9} \quad x \neq -9, 9$$

EX 7 Simplify

$$\frac{64-x^2}{x^2+x-72}$$

$$\frac{(8-x)(8+x)}{(x-8)(x+9)}$$

$$\frac{-1(8+x)}{x+9}$$

$$\frac{-8-x}{x+9} \quad x \neq -9, 8$$

11.2 Multiplying and Dividing Rational Expressions

Simplifying Rational Expressions

1. Multiply by the Reciprocal
2. Factor
3. Reduce coefficients
4. Eliminate common factors
5. Determine restrictions

EX 1 Simplify

$$\frac{2}{x} \cdot \frac{x^2}{4}$$

$$\frac{x}{2} \quad x \neq 0$$

1. Factor
2. Reduce
3. Eliminate
4. Determine restrictions

EX 2 Simplify

$$\frac{2-z}{4+5z}\cdot\frac{3}{z}$$

$$\frac{3(2-z)}{z(4+5z)}$$

$z \neq -4/5, 0$

1. Factor
2. Reduce
3. Eliminate
4. Determine restrictions

EX 3 Simplify

$$\frac{x^2+4x-12}{x^2+8x+16}\cdot\frac{2x+8}{x-2}$$

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

$$\frac{2(x+6)}{x+4} \qquad x \neq -4, 2$$

1. Factor
2. Reduce
3. Eliminate
4. Determine restrictions

EX 4 Simplify

$$\frac{8}{3x}\div\frac{2}{x^2}$$

$$\frac{8}{3x}\cdot\frac{x^2}{2}$$

$$\frac{4x}{3} \qquad x \neq 0$$

1. Multiply by the Reciprocal
2. Factor
3. Reduce
4. Eliminate
5. Determine restrictions

EX 5 Simplify

$$\frac{3x+6}{18}\div\frac{4x+8}{3}$$

$$\frac{3x+6}{18}\cdot\frac{3}{4x+8}$$

$$\frac{3(x+2)}{18}\cdot\frac{3}{4(x+2)}$$

$$\frac{9}{72}=\frac{1}{8} \qquad x \neq -2$$

1. Multiply by the Reciprocal
2. Factor
3. Reduce
4. Eliminate
5. Determine restrictions

EX 6 Simplify

$$\frac{x^2-1}{x^2+x-6}\div\frac{x-1}{2x+6}$$

$$\frac{x^2-1}{x^2-x+6}\cdot\frac{2x+6}{x-1}$$

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

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

1. Multiply by the Reciprocal
2. Factor
3. Reduce
4. Eliminate
5. Determine restrictions