

Warm Up:

1. Simplify the following expressions:

a) $\frac{18x}{6x^3}$

b) $\frac{x+2}{x+2}$

c) $\frac{x-2}{2-x}$

d) $\frac{x+2}{x}$

2. For each of the expressions given in question 1 above, write the restrictions on the variable.

a)

b)

c)

d)

Rational Expressions

Rational expressions are ratios of polynomial expressions.

The numerator is a polynomial expression, and the denominator is another polynomial expression.

All of the expressions in the warm-up problems are rational expressions.

Simplifying Rational Expressions

To simplify a rational expression, factor the numerator, then factor the denominator, and divide out any common factors.

Examples:

Simplify the rational expressions.

1. $\frac{x^2+4x}{x^3}$

Factor the numerator: $\frac{x(x+4)}{x^3}$

Since there is a factor of x in the numerator, factor an x out of the denominator: $\frac{x(x+4)}{x(x^2)}$

Now divide out the common factor:

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

To find restrictions, set the denominator equal to zero and solve for the variable. Any solutions to this are restrictions on the variable.