Section 7.1 Rational Expressions

# Objective 1: Finding the Domain of a Rational Expression

A **rational expression** is an expression that can be written as the quotient of two polynomials and as long as is not . The following are some examples of rational expressions.

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| --- | --- | --- |
|  |  |  |

Rational expressions are sometimes used to describe functions. For example, the function is a **rational function** since is defined by a rational expression.

A rational expression is undefined if the denominator is . For example, the expression is undefined when is . For this reason, we must exclude from the domain of the function . The domain of is all real numbers except . We can write the domain of using set builder notation as .

Find the domain of the rational function.

|  |  |
| --- | --- |
| a. | b. |

# Objective 2: Simplifying Rational Expressions

Recall that a fraction is in simplest form if the numerator and denominator have no common factors other than or . The same is true for a rational expression. To **simplify** a rational expression means to write the expression so that the numerator and denominator have no common factors other than or .

Write each expression in simplest form.

|  |  |
| --- | --- |
| a. | b. where |

To simplify a rational expression, first completely factor the numerator and denominator. Then, divide out factors common to the numerator and denominator.

**Fundamental Principle of Rational Expressions:**

For any rational expression and any polynomial , where ,

since is equal to .

For now, we assume that variables in a rational expression do not represent values that make the denominator .

Simplify the rational expression.

|  |  |
| --- | --- |
| c. | d. |

|  |  |
| --- | --- |
| e. | f. |