

## Math 150 Lecture Notes Rational Expressions

A **fractional expression** is the quotient of two algebraic expressions.

A **rational expression** is a fractional expression in which both numerator and denominator are polynomials.

### The Domain of an Algebraic Expression

The **domain** of an algebraic expression is the set of real numbers for which the variable is defined.

### Simplifying Rational Expressions

To **simplify** a rational expression, factor both numerator and denominator and divide both by any common factors.

### Multiplying/Dividing Rational Expressions

To **multiply** rational expressions, use the definition of multiplication of fractions (multiply numerators for the new numerator and multiply denominators for the new denominator).

Note: In actual practice, factor each numerator and denominator first. Write as a new fraction with the product of factors in the numerator and denominator. Simplify before actually multiplying the numerators and denominators.

### Adding/Subtracting Rational Expressions

To **add** or **subtract** all types of expressions, they must be **like terms**. For rational expressions, that includes a common denominator.

## **Compound Fractions**

A **compound fraction** is one in which the numerator, the denominator, or both are fractional expressions.

Two approaches to simplify a compound fraction:

1. Simplify numerator and denominator separately. Then multiply by the reciprocal to divide.
2. Find the LCD of all fractions in the expressions. Multiply by a form of one in which the numerator and denominator are the LCD.

## **Rationalizing the Denominator/Numerator**

When a fraction has a denominator of the form  $A + B\sqrt{C}$ , the denominator can be rationalized by multiplying the fraction by a form of one that has the **conjugate**  $A - B\sqrt{C}$  in both numerator and denominator.