Section P.5: Rational Expressions

Key Topics: rational expressions, simplified form, operations, LCD, complex fractions

We use the same language to describe rational expressions that we use to describe rational numbers. For $\frac{x^2+2x-3}{x^2+5x+6}$, we call x^2+2x-3 the _____ and x^2+5x+6 the _____.

The _____ of a rational expression is the set of all real numbers _____ those that result in a _____.

Simplifying Rational Expression

To simplify a rational expression, we

1. _____ its _____ and _____.
2. Divide the numerator ___ denominator by any _____.

Multiplication and Division

For rational expressions $\frac{A}{B}$ and $\frac{C}{D}$,

$\frac{A}{B}\cdot\frac{C}{D}=$_____ and $\frac{\frac{A}{B}}{\frac{C}{D}}=$_____$=\frac{A}{B}\cdot\frac{D}{C}=$_____

if _____, _____. if _____, _____, _____.

Addition and Subtraction of Rational Expressions

For rational expressions $\frac{A}{D}$ and $\frac{C}{D}$ (____ denominator _____),

$$\frac{A}{D} + \frac{C}{D} = \_\_\_\_\_ \quad \text{and} \quad \frac{A}{D} - \frac{C}{D} = \_\_\_\_\_.$$

For rational expression $\frac{A}{B}$ and $\frac{C}{D}$ (_____, _____),

$$\frac{A}{B} + \frac{C}{D} = \_\_\_\_\_ \quad \text{and} \quad \frac{A}{B} - \frac{C}{D} = \_\_\_\_\_.$$

To Find the LCD for Rational Expressions

1. _____ denominator polynomial _____.
2. Form a product of the different _____ factors of each polynomial. (Each distinct factor is used once.)
3. Attach to each factor in this product the _____ exponent that appears on this factor in ___ of the factored denominators.

Procedure for Adding or Subtracting Rational Expressions with Different Denominators

Step 1 Find the_____.

Step 2 Using $\frac{A}{B} = \frac{AC}{BC}$, write ____ rational expression as a rational expression with the_____ as the _____.

Step 3 Following the _____ of operations, add or subtract _____, keeping the ____ as the denominator.

Step 4 _____.

Procedures for Simplifying Complex Fractions

Method 1 Perform the operations indicated in ____ the numerator and denominator of the complex fraction. Then _____ the resulting _____ by the _____ .

Method 2 _____ the numerator ___ the denominator of the _____ fraction by the ____ of __ rational expressions that appear in _____ the numerator or the denominator. _____ the result.

Simplify $\dfrac{6x^3+9x^2-27x}{12x^4+54x^3-108x^2}$ by each Method.