Adding Fractions
Preliminaries and Objectives

Preliminaries

- Multiply polynomials (FOIL)
- Factor polynomials
- Combine like terms
- Reduce fractions

Objectives

- Add fractions and simplify
Adding Fractions

\[
\frac{1}{2} + \frac{1}{4} = 
\]

Diagram: Two fraction pieces combined to show the addition of \(\frac{1}{2}\) and \(\frac{1}{4}\).
Recap

- Factor denominators
- Supply missing factors to find the Least Common Denominator
- Add fractions by adding the numerators over the common denominator
- Simplify numerator by distributing and combining like terms
- Reduce the fraction by factoring numerator and cancelling common factors
Adding Fractions

\[ \frac{1}{2} + \frac{1}{4} = \]

\[ \frac{4}{8} + \frac{2}{8} = \frac{6}{8} \]
Adding Fractions

\[
\frac{1}{2} \cdot \frac{2}{2} + \frac{1}{4} = \frac{3}{4}
\]
Process

- Factor denominators
- Supply missing factors to find the Least Common Denominator
- Add fractions by adding the numerators over the common denominator
- Simplify numerator by distributing and combining like terms
- Reduce the fraction by factoring numerator and cancelling common factors
Example 1

\[
\frac{3}{(x + 1)} \cdot \frac{2}{2} + \frac{1}{2} \cdot \frac{x + 1}{(x + 1)} = \frac{6}{2(x + 1)} + \frac{x + 1}{2(x + 1)} = \frac{x + 7}{2(x + 1)}
\]
Example 2

\[
\frac{2x - 1}{x^2 - 1} - \frac{3 - 2x}{x^2 + 3x + 2} = \\
\frac{2x - 1}{(x + 1)(x - 1)} - \frac{3 - 2x}{(x + 1)(x + 2)} = \\
\frac{(2x - 1)(x + 2)}{(x + 1)(x - 1)(x + 2)} + \frac{(-3 + 2x)(x - 1)}{(x + 1)(x + 2)(x - 1)} = \\
\frac{2x^2 + 3x - 2}{(x + 1)(x - 1)(x + 2)} + \frac{2x^2 - 5x + 3}{(x + 1)(x + 2)(x - 1)} = \\
\frac{4x^2 - 2x + 1}{(x + 1)(x - 1)(x + 2)}
\]
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