Adding Fractions

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

Objectives
- Add fractions and simplify

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

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

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

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

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

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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