Factoring By Grouping

Example 1:

Multiply:

\((x + 4)(x + 3)\)

Step 1: \(x(x + 4) + 3(x + 4)\)
Step 2: \(x^2 + 4x + 3x + 12\)
Step 3: \(x^2 + 7x + 12\)

Consider the polynomial in Step 2:

\(x^2 + 4x + 3x + 12\)

We can factor this polynomial and get the original product. Factoring is simply the distributive property in reverse.

Step 1: Group the first two terms and the last two terms together.
Step 2: Factor out the greatest common factor (GCF) in the first two terms.
Step 3: Cheat! The second group will be factorable resulting in the same binomial from Step 2.
Step 4: Factor out the binomial

\[
\begin{align*}
\text{Step 1} & : x^2 + 4x + 3x + 12 \\
\text{Step 2 & 3} & : x(x + 4) + 3(x + 4) \\
\text{Step 4} & : (x + 4)(x + 3)
\end{align*}
\]
Example 2:

Factor by Grouping:

a.) \[ 6x^2 - 5x + 12x - 10 \]

b.) \[ 7w^2 + 14w - w - 2 \]

c.) \[ 16a^3 - 4a^2b^2 - 4ab + b^3 \]
Factoring By Grouping

Practice Problems

Factor each polynomial by grouping:

1. \(x^2 + 2x + x + 2\)

2. \(a^2 - 6a + a - 6\)

3. \(15x^2 + 15xy - 5xz - 6yz\)

4. \(5m - 6p - 2mp + 15\)