# Techniques in Factoring Polynomials:

I. Always factor out the largest common factor first.

\[ 2x^2 (3x^2 - 5x + 7) \]
\[ = 6x^4 - 10x^3 + 14x^2 \]
\[ = 2x^2 (3x^2 - 5x + 7) \]

A. \[ 6n^3 + 24n^2 + 12n \]
\[ = 6n(n^2 + 4n + 2) \]

B. \[ a(b-2) + c(b-2) \]
\[ = (b-2)(a+c) \]

\[ 2 \cdot 3 = 6 \text{ factors} \]

C. \[ 18a^2b - 15ab^2 \]
\[ = 3ab(6a - 5b) \]
II. Consider factoring by grouping. (4 terms)

A. \( x^3 + 3x^2 + 6x + 18 \)

\[ = x^2 + 3x^2 + 6x + 18 \]
\[ = x^2(x+3) + 6(x+3) \]
\[ = (x+3)(x^2+6) \]

1. Group the term into pairs.
2. Factor out the common factor from each pair.
3. Factor out common binomial factor.

B. \( 2x^3 - 3x^2 + 6x - 9 \)

\[ = 2x^3 - 3x^2 + 6x - 9 \]
\[ = x^2(2x-3) + 3(2x-3) \]
\[ = (2x-3)(x^2+3) \]

C. \( a^3 - 3a^2 - 2a + 6 \)

\[ = a^3(a-3) - 2(a-3) \]
\[ = (a-3)(a^2 - 2) \]

or, \( a^3 - 2a - 3a^2 + 6 \)

\[ = a(a^2 - 2) - 3(a^2 - 2) \]
\[ = (a^2 - 2)(a - 3) \]
Commutative property:

Order doesn't matter in multiplication or add.