EXTRA CREDIT.

Fri. 2pm. Lucas. 119.

FACTURING:

(1) Common Factor. NOT ADDITION

- Look at the coefficient and find a common factor.
- Find the variable that is in every term ($x^2$).
- This is the opposite of distributive law.

E.g. (1) $6n^3 + 24n^2 + 12n$

\[ = 6n(n^2 + 4n + 2) \]

(2) $a(b-2) + c(b-2)$

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

\* Make sure your factors are in parenthesis.

(3) $18a^2b - 15ab^2$

\[ = 3ab(6a - 5b) \]

\* Always factor out the largest common factor.

(2) Grouping

- Steps
  1. Group the terms in pairs based on seeing their common things.
  2. Factor out the common factor in each pair.
  3. Further factor out the common binomial.

\* If you have four terms, the first thing you should try is "Grouping".
\[ x^3 + 3x^2 + 6x + 18 \]
\[ = (x^3 + 3x^2) + (6x + 18) \]
\[ = x^2(x + 3) + 6(x + 3) \]
\[ = (x^2 + 6)(x + 3) \]

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

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

"**COMMUTATIVE PROPERTY OF MULTIPLICATION**"

\[ a \cdot b = b \cdot a \]
\[ a + b = b + a \] > order doesn't matter for addition/multiplication.
Techniques in Factoring Polynomials

I. Always factor out the largest common factor first.

A. \(6n^3 + 24n^2 + 12n\)

\[= 6n(n^2 + 4n + 2)\]

\[\Rightarrow 6n \text{ is in at least every term.}\]

B. \(a(b - 2) + c(b - 2)\)

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

\[(b - 2) \text{ is in at least every term.}\]

C. \(18a^2b - 15ab^2\)

\[= 3ab(6a - 5b)\]

\[\text{Great numeric common factor.}\]

\[\text{each have at least } a^2\]
\[\text{each have at least } b^2\]
II. Consider factoring by grouping.

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

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

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