Mini-Guide to Factoring

- **Step 1:** Are there any common factors in all of the terms? If so, use the distributive property (backwards) to pull out the GCF. (Sect. 5.1)

  Ex: $12ab^5 + 8ab^4 - 4ab^3 = 4ab^3(3b^2 + 2b - 1)$ (GCF $= 4ab^3$)

- **Step 2:**

  1. Do you have a trinomial of degree 2? Then, if it factors, it will factor into two binomials $(\_\_ \pm \_\_)\cdot(\_\_ \pm \_\_)$ (Sect. 5.2 & 5.3)

     Ex: $3b^2 + 2b - 1 = (3b - 1) \cdot (b + 1)$

     $\Rightarrow \quad 12ab^5 + 8ab^4 - 4ab^3 = 4ab^3(3b^2 + 2b - 1)$

     $= 4ab^3(3b - 1)(b + 1)$

  2. Do you have a **difference** of squares $a^2 - b^2$? Then $a^2 - b^2 = (a + b) \cdot (a - b)$. (Sect. 5.4)

     Ex: $4x^2 - 25 = (2x + 5) \cdot (2x - 5)$ since $4x^2 = (2x)^2$ and $25 = 5^2$

     Ex: $2x^2y - 18y = 2y(x^2 - 9)$ (Factoring out the GCF)

     $= 2y(x + 3)(x - 3)$ since $x^2 - 9 = (x + 3)(x - 3)$

     (Note: A sum of squares is prime. Ex: $4x^2 + 25$ is prime.)

  3. Do you have 4 terms? This may require factoring by grouping. (Sect. 5.1)

     Ex: $m^2 + 2m - mn - 2n = m(m + 2) - n(m + 2)$

     $= (m - n)(m + 2)$