Section 7 – 1B: Factoring Trinomials of the Form

$$Ax^2 \pm Bx \pm Cx \pm D$$

by

The Factor By Grouping Method

Factoring by Grouping requires an even number of terms. For the purpose of this book we will limit our polynomials to **4 term expressions.**

Examples of 4 Term Polynomials

$6x^2 - 2x + 3x - 1$ $\qquad$ $6x^2 - 4x - 3x + 2$ $\qquad$ $12x^2 + 3x - 8x - 4$

Factoring by Grouping requires that you **group the first two terms together** and **the last two terms together.** You then **factor out the GCF in the first group** and **factor out the GCF in the second group.** This will result in a two term expression and **each term will look like a distribute problem.** The final step requires that you **factor out the common binomial in each term**. You will then have the final factored form which will be a product of two binomials.

The Factor By Grouping Method

Example 1

Factor: $6x^2 + 3x - 8x - 4$

Step 1: **Factor out the GCF in the first group** and **factor out the GCF in the second group.**

$6x^2 + 3x - 8x - 4$

factor out a 3x from the **first two terms**
factor out a – 4 from the **last two terms**

$3x(2x + 1) - 4(2x + 1)$

Step 2: **Factor out the GCF of (2x – 1) in each term to get the product of two binomials.**

$3x(2x + 1) - 4(2x - 1)$

$(2x + 1)(3x - 4)$

Factor: $6x^2 + 3x - 8x - 4$

$= (2x + 1)(3x - 4)$

Factor By Grouping Method

Example 2

Factor: $2x^2 - 5x - 4x + 10$

Step 1: Factor out an x from the **first two terms**

Factor out a – 2 from the **last two terms**

$$2x^2 - 5x - 4x + 10$$

$$x(2x - 5) - 2(2x - 5)$$

Step 2: **Factor out the GCF of (2x – 5) in each term to get the product of two binomials.**

$$x(2x - 5) - 2(2x - 5)$$

$$(2x - 5)(x - 2)$$

Example 3

Factor: $12x^2 - 28x - 3x + 7$

Step 1: Factor out a **4x** from the **first two terms**

Factor out a **– 1** from the **last two terms**

$$12x^2 - 28x - 3x + 7$$

$$4x(3x - 7) - 1(3x - 7)$$

Step 2: **Factor out the GCF of (3x – 7) in each term to get the product of two binomials.**

$$4x(3x - 7) - 1(3x - 7)$$

$$(3x - 7)(4x - 1)$$

Example 4

Factor: $3x^2 - 6x + x - 2$

Step 1: Factor out a **3x** from the **first two terms**
Factor out a **+ 1** from the **last two terms**

$$3x^2 - 6x + x - 2$$

$$3x\,(x - 2) + 1\,(x - 2)$$

Step 2: **Factor out the GCF of (x – 2) in each term to get the product of two binomials.**

$$3x\,(x - 2) + 1\,(x - 2)$$

$$(x - 2)\ (3x + 1)$$

This is what the problem should look like when you do it for homework.

Example 5

Factor: $6x^2 - 4x - 15x + 10$

$$2x\,(3x - 2) - 5\,(3x - 2)$$

$$(3x - 2)\,(\,2x - 5)$$

Example 6

Factor: $20x^2 + 12x - 5x - 3$

$$4x\,(5x + 3) - 1\,(5x + 3)$$

$$(5x + 3)\,(\,4x - 1)$$

Example 7

Factor: $x^2 - 5x + x - 5$

$$x\,(x - 5) + 1\,(x - 5)$$

$$(x - 5)\,(\,x + 1)$$

