Factoring: Difference of Squares

UNIVERSITY OF MINNESOTA

Preliminaries and Objectives

Preliminaries
- Distributive Property
- Expanding Binomials (FOIL)
- Prime Factorization of Integers
- Greatest Common Factors

Objectives
- Factor using the Difference of Squares

Example 1

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

$$= x^2 - 9$$

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

Example 2

$$4x^2 - 25 = (2x + 5)(2x - 5)$$

Example 3

$x^2 + 4 = ???$

$x^2 + 4 = (x + 2)(x + 2)$ $= x^2 + 2x + 2x + 4$

$x^2 + 4 = (x - 2)(x - 2)$ $= x^2 - 2x - 2x + 4$

$x^2 + 4$ does not factor

Example 4

$$x^4 - 16 = (x^2 + 4)(x^2 - 4)$$

$$= (x^2 + 4)(x + 2)(x - 2)$$

Example 5

$x^9 - 36$ does not factor

Example 6

$$x^6 - 36 = (x^3 + 6)(x^3 - 6)$$

Example 7

$$3x^3 - 12x = 3x(x^2 - 4)$$
$$= 3x(x + 2)(x - 2)$$

Example 8

$$16x^4y^2 - 25a^2y^6 = (4x^2y + 5ay^3)(4x^2y - 5ay^3)$$

$$x^2 - 81 = (x + 9)(x - 9)$$

$$9x^2 - 100 = (3x + 10)(3x - 10)$$

$$16a^2 b^4 - 25b^2 = (4ab^2 + 5b)(4ab^2 - 5b)$$

Difference of Squares

- Two terms
- Minus sign between (Difference)
- Perfect squares (of Squares)

$$a^2 - b^2 = (a + b)(a - b)$$

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