Section 9.3 Special Properties of Binomial Multiplication

Goal • Use special product patterns to multiply polynomials.

Square of a Binomial Pattern

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

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

Example 1: Find the product

a. $(x + 3)^2$

$(x+3)(x+3)$

FOIL

x^2+6x+9

b. $(x - 4)^2$

$a \quad b$

$a^2-2ab+b^2$

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

$x^2-8x+16$

c. $(2x + 5)^2$

$a=2x \quad b=5$

$(2x)^2+2(2x)(5)+5^2$

$4x^2+20x+25$

Checkpoint: Find the product

1. $(x + 9)^2$

$(x+9)(x+9)$

$x^2+18x+81$

2. $(7a - 6)^2$

$a=7a \quad b=6$

$(7a)^2-2(7a)(6)+6^2$

$49a^2-84a+36$

Sum and Difference Pattern

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

Example 2: Find the product.

a. $(x + 5)(x - 5)$

FOIL

$x^2+5x-5x-25$

x^2-25

b. $(2x + 3)(2x - 3)$

$a=2x \quad b=3$

$(2x)^2-(3)^2$

$4x^2-9$

c. $(4 - w)(4 + w)$

$a=4 \quad b=w$

$(4)^2-(w)^2$

$16-w^2$

Checkpoint: Find the product.

3. $(5m + 10)(5m - 10)$

$a=5m \quad b=10$

$(5m)^2-(10)^2$

$25m^2-100$

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Multiplying Functions

Perform the indicated operations using the functions $f(x) = 3x + 2$ and $g(x) = 3x - 4$

a) $f(x) \cdot g(x)$

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

FOIL $\longrightarrow$ $9x^2+6x-12x-8$

$\boxed{9x^2-6x-8}$

b) $f(x) + g(x)$

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

$\boxed{6x-2}$

c) $(f(x))^2$

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

$9x^2+6x+6x+4$

$\boxed{9x^2+12x+4}$