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5.4 Factoring Special Polynomials

When we multiply a binomial by itself, we square the binomial. The result is a polynomial called the perfect square trinomial.

Examples:

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

$(t - 3)^2 = (t - 3)(t - 3) = \mathbf{t^2 - 6t + 9}$

$(5n + 3)^2 = (5n + 3)(5n + 3) = \mathbf{25n^2 + 30n + 9}$

Each trinomial is a perfect square trinomial!

There are special binomial products that produce binomials. The result is a polynomial called difference of squares.

Examples:

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

$= \mathbf{x^2 - 16}$

$(5n + 3)(5n - 3) = 25n^2 - 15n + 15n - 9$

$= \mathbf{25n^2 - 9}$

Each binomial result is a difference of squares!

Two rules about factoring special polynomials you should know:

1. Perfect square trinomials, $a^2 + 2ab + b^2$ and $a^2 - 2ab + b^2$, factor into $(a + b)^2$ and $(a - b)^2$, respectively;
2. Difference of squares, $a^2 - b^2$, factor into $(a + b)(a - b)$.

<u>Example 1: Factoring Difference of Squares</u>

Factor each binomial, if possible.

a) $x^2 - 64$

b) $4v^2 - 49$

c) $7a^3b^2 - 28a^5$

c) $x^2 - 100$

d) $25h^2 - 81$

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Example 2: Factoring Perfect Square Trinomials

Factor each trinomial

a) $x^2 + 6x + 9$

b) $25n^2 + 20n + 4$

c) $r^2 + 6r + 9$

d) $9m^2 - 12m + 4$

Homework:

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#2 – 7 (pick 3)

#8 – 11

#13, 15, 17