2.2 Factoring Special Polynomials

A. Factoring PERFECT SQUARE TRINOMIALS

A perfect square trinomial has the form: _____ax^2+bx+c_____

Perfect square trinomials have the following characteristics:

- ax^2 and c must be perfect squares (1, 4, 9, x^2, x^4, etc….)
- bx is equal to twice the product of the square roots of ax^2 and c terms.

Example 1: Verify that the following trinomials are perfect square trinomials.

a) $4x^2 + 12x + 9$

$\sqrt{4x^2}$ $\sqrt{9}$

$2(2x)(3) = 12x$

b) $9x^2 - 6x + 1$

$\sqrt{9x^2}$ $\sqrt{1}$

$2(3x)(1) = 6x$

Example 2: Factor the following trinomials

a) $4x^2 + 4x + 1$

check: $\sqrt{4x^2}$ $\sqrt{1}$

$2(2x)(1) = 4x$

$= (2x + 1)^2$

b) $4x^2 - 12x + 9$

check: $\sqrt{4x^2}$ $\sqrt{9}$

$2(2x)(3) = 12x$

$= (2x - 3)^2$

c) $4 - 20x + 25x^2$

check: $\sqrt{4}$ $\sqrt{25x^2}$

$2(2)(5x) = 20x$

$= (2 - 5x)^2$

d) $x^2 - 2x + 1$

check: $\sqrt{x^2}$ $\sqrt{1}$

$2(x)(1) = 2x$

$= (x-1)^2$

e) $100x^2 - 140xy + 49y^2$

check: $\sqrt{100x^2}$ $\sqrt{49y^2}$

$2(10x)(7y) = 140xy$

$= (10x - 7y)^2$

B. Factoring the DIFFERENCE OF SQUARES

The difference of squares has the form: _____$ax^2 - c$_____

The difference of squares has the following characteristics:

- There are only two terms in the polynomial (binomial) no bx (middle) term
- Each term is a perfect square
- Second term must be subtracted from the first term

Example 3: Factor the following binomials

a) $16x^2 - 25$

check: $\sqrt{16x^2}$ $\sqrt{25}$

$(4x)$ (5)

$= (4x-5)(4x+5)$

b) $49n^2 - 121$

$= (7n-11)(7n+11)$

c) $x^4 - 1$

$= (x^2+1)(x^2-1)$

$= (x^2+1)(x-1)(x+1)$

d) $5x^4 - 80y^4$

$= 5(x^4-16y^4)$

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

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

e) $(x-3)^2 - 16$

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

$= (x+1)(x-7)$

f) $w^2 - 5$

$= (w-\sqrt{5})(w+\sqrt{5})$

HW: 2.2 WS