Section 3.8 - Factoring of Special Polynomials

① Difference of Squares

$4x^2 - 9$

$4x^2 + 0x - 9$

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

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

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

-36

$-6 \mid 6$

$9x^2 - 16$

$9x^2 - 0x - 16$

-144

$-12 \mid 12$

$9x^2 + 12x - 12x - 16$

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

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

$4x^2 - 9$ $\quad$ $9x^2 - 16$

$2x \quad 3$ $\quad$ $3x \quad 4$

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

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

$36x^2 - 25$

$6x \quad 5$

$(6x+5)(6x-5)$ → Conjugates

$4x^2 + 9$ $\quad$ 36

$4x^2 - 0x + 9$ $\quad$ 1

Difference of Squares

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

$81m^2 - 49$

$a = 9m \quad b = 7$

$(9m+7)(9m-7)$

$3x^2 - 12$

$3(x^2 - 4)$

$a = x \quad b = 2$

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

$5x^2 - 45$

$5(x^2 - 9)$

$a = x \quad b = 3$

$5(x+3)(x-3)$

Perfect Square Trinomials

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

$(a+b)^2$ $x(x+3)+3(x+3)$

$x^2+3x+3x+9$

x^2+6x+9

$(a)^2+2(x)(3)+(b)^2$

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

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

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

$a=2x$ $b=3$

$2ab=2(2x)(3)$

$=12x$

$(a-b)^2$

$(2x-3)^2$

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

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

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

$4x^2-12x+9$

Steps for factoring Perfect Square Trinomials:

1. Determine if the 1st and 3rd terms are Perfect Squares.
2. Determine if the 2nd term is 2 times the Square roots of the 1st and 3rd terms.
3. Fit the trinomial to our factoring Rule

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

or

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

Ex) $36x^2+12x+1$

$a=6x$ $\quad b=1$

$2ab$

$2(6x)(1)$

$=12x$

$(a+b)^2$

$(6x+1)^2$