Special Factoring Formulas

Goal: To factor a difference of two perfect squares and a perfect square trinomial.

The Difference of Two Squares Formula

$$A^2 - B^2 = (A+B)(A-B)$$

Proof: $(A+B)(A-B)$

$A^2 - AB + AB - B^2$

$AB - AB = 0$

$A^2 - B^2$

Done

ex Factor

a) $x^2 - 49 = (x+7)(x-7)$

$A^2 - B^2 = (A+B)(A-B)$

$A = x$, $B = 7$

$(x+7)(x-7)$

Perfect □'s

$1^2 = 1$

$2^2 = 4$

$3^2 = 9$

$\vdots$

$12^2 = 144$

x^2

$x^4 = x^2 \cdot x^2$

$x^6 = x^3 \cdot x^3$

b) $16m^2 - 64n^2$

$16(m^2 - 4n^2)$

$A^2 - B^2 = (A+B)(A-B)$

$A = m, \quad B = 2n$

$$16(m+2n)(m-2n)$$

c) $a^2b^2 - \frac{1}{4}$

$$A^2 - B^2 = (A+B)(A-B)$$

$A = ab, \quad B = \frac{1}{2}$

$$\left(ab + \frac{1}{2}\right)\left(ab - \frac{1}{2}\right)$$

d) $a^2 - 8a + 16 - b^2$

$(a-4)(a-4)$

$A^2 - B^2 = (A+B)(A-B)$

$(a-4)^2 - b^2$

$A = (a-4), \quad B = b$

$$\left((a-4) + b\right)\left((a-4) - b\right)$$

$$(a-4+b)(a-4-b)$$

The Perfect Square Trinomial Factoring Formula

$$A^2 + 2AB + B^2 = (A+B)^2$$

$$A^2 - 2AB + B^2 = (A-B)^2$$

(ex) Factor

a) $25x^2 + 30xy + 9y^2$

$+15xy$

$(5x + 3y)(5x + 3y)$ ✓

$+15xy$

$(5x+3y)^2$

reverse FOIL

$A^2 + 2AB + B^2 = (A+B)^2$

$A = 5x$, $B = 3y$

$(5x+3y)^2$

$2AB = 30xy$ ✓

using formula

b) $49p^2 - 84pq + 36q^2$

$A = 7p$, $B = 6q$

$(7p - 6q)^2$

$2AB = 2(7p)(6q)$ ✓

$A^2 - 2AB + B^2 = (A-B)^2$

CW

Factor

① $9x^4 - 25x^2$

$x^2(3x+5)(3x-5)$

(2) $64m^2 + 48mn + 9n^2$

$(8m + 3n)^2$