c) Remarkable Identites Revisited

a) $(x+9)(x-9) =$ $x^2 - 81$

b) $(3p-8)(3p+8) =$ $9p^2 - 64$

$$(\overset{F_1}{a}+b)(\overset{F_2}{a}-b) = a^2 - b^2$$

difference of squares

$$a^2 - b^2 = (\sqrt{a^2} + \sqrt{b^2})(\sqrt{a^2} - \sqrt{b^2})$$

perfect square exponent is even

Example: Factor $z^2 - \underline{256}$ $\sqrt{256}$?

- Determine the square roots of each term (ignore that one is negative) $\sqrt{z^2} = z$ $\sqrt{256} = 16$
- Create the product of two binomial conjugates:

(Square Root First Term + Square Root Second Term)

$(z + 16)$

$\times$

(Square Root First Term − Square Root Second Term)

$(z - 16)$

Therefore...

$$z^2 - 256 = (z+16)(z-16)$$

Factor.

$\sqrt{m^2} = m$

$\sqrt{289} = 17$

1. $m^2 - 289$

$(m+17)(m-17)$

2. $4x^2 - 25y^2$ $\sqrt{4x^2} = 2x$ $\sqrt{25y^2} = 5y$

$(2x+5y)(2x-5y)$

$\sqrt{w^2} = w$

$\sqrt{36z^2} = 6z$

3. $2w^2 - 72z^2$ $= 2(w^2 - 36z^2)$

$= 2(w-6z)(w+6z)$

4. $16x^4 - 81$ $= (4x^2+9)(4x^2-9)$

$= (4x^2+9)(2x \quad)(2 \quad)$