

## 5.6 Factor a Perfect Square Trinomial and a Difference of Squares

### A Factor a Perfect Square Trinomial

If an expression is a *perfect square trinomial*, then use the following identities to factor.

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

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

Example 1. Verify if the following trinomials are perfect square trinomials. Then, factor.

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

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

c)  $9x^2 - 24xy + 16y^2$

d)  $4a^2x^2 + 4abxy + b^2y^2$

e)  $\frac{9x^2}{16} - 2xy + \frac{16y^2}{9}$

f)  $4a^2 - 12ab + 9b^2$

Example 2. Factor fully by factoring first the GCF.

a)  $12x^2 + 60x + 75$

b)  $32x^3 - 160x^2 + 200x$

c)  $72x^3y - 120x^2y^2 + 50xy^3$

## B Factor a Difference of Squares

To factor a *difference of squares*, use the following identity

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

Example 3. Verify if the following binomials are difference of squares. Then, factor.

|                    |                              |                                       |
|--------------------|------------------------------|---------------------------------------|
| a) $1 - 9x^2$      | b) $4a^2 - 25b^2$            | c) $16a^2x^2 - 25b^2y^2$              |
| d) $(x + 1)^2 - 4$ | e) $(2x + 1)^2 - (2x - 1)^2$ | f) $\frac{4a^2}{9} - \frac{9b^2}{16}$ |

Example 4. Factor fully by factoring first the GCF.

|                   |                       |                      |
|-------------------|-----------------------|----------------------|
| a) $8x^2 - 32y^2$ | b) $18x^2y^2 - 50y^4$ | c) $128x^2y - 50y^3$ |
|-------------------|-----------------------|----------------------|

Example 5. Factor fully.

|                |                |                   |
|----------------|----------------|-------------------|
| a) $a^4 - b^4$ | b) $x^8 - y^8$ | c) $a^{16} - b^8$ |
|----------------|----------------|-------------------|

Example 6. Find the value of the parameter  $k$ , such that the following expressions may be factored over the integers.

a)  $4x^2 + kx + 25$

b)  $kx^2 - 12xy + 4y^2$

Example 7. Prove the following identity (challenge).

$$(a + b + c)(a + b - c)(a - b + c)(-a + b + c) = 2a^2b^2 + 2a^2c^2 + 2b^2c^2 - a^4 - b^4 - c^4$$

Notes: Textbook Pages 248-253

Homework: Textbook Pages 253-255 #1ab, 2ab, 3ab, 4ab, 5ab, 6ab, 8ad, 9a, 10, 14, 19, 20, 21