8.3.4 Is there a pattern?

Special Cases of Factoring

Are there any types of polynomials you can factor using a pattern? If so, what do those polynomial expressions look like and how can you recognize them? In this lesson, you will think about special patterns that will help you to factor.

$$x^2-9=(x+3)(x-3)$$

$$4x^2-25=(2x+5)(2x-5)$$

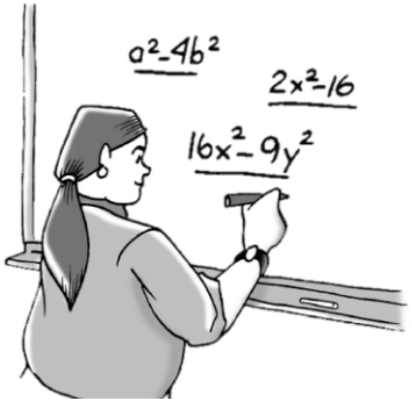
$$a^2-b^2=(a+b)(a-b)$$

$$x^2+6x+9=(x+3)^2$$

$$4x^2+20x+25=(2x+5)^2$$

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

8-137. You may remember that a **difference of squares** can be factored by following a pattern. Decide which of the expressions below might be a difference of squares. For each difference of squares, show the squares clearly and then write the product. For example, $16x^2 - 9y^2$ can be rewritten as the difference of squares $(4x)^2 - (3y)^2$.



i. $a^2 - 4b^2$ *ii.* $2x^2 - 16$

iii. $-x^2 + y^4$ *iv.* $4a^2 + 9b^2$

8-138. To factor each of the following expressions, use the procedures you developed to identify factors of polynomials. Each final answer should be a linear factor times a quadratic factor. Look for patterns in the factors.

a. $x^3 - 1$ $=(x-1)(x^2+x+1)$

b. $x^3 + 8$ $=(x+2)(x^2-2x+4)$

c. $x^3 - 27$ $(x-3)(x^2+3x+9)$

d. $x^3 + 125$ $=(x+5)(x^2-5x+25)$

	x^2	$+x$	$+1$
x	x^3	$+x^2$	x
-1	$-x^2$	$-x$	-1

Factor a cubic

$a^3+b^3=(a+b)(a^2-ab+b^2)$

$a^3-b^3=(a-b)(a^2+ab-b^2)$

a. $x-1$? ✓

$x+1$? ✗

b. $x^3+8=0$

$\sqrt[3]{-8}=-2$

$x=-2$

	x^2	$-2x$	$+4$
x	x^3	$-2x^2$	$4x$
$+2$	$2x^2$	$-4x$	$+8$

Root: $x^3-1=0$

$x^3=1$

$x=1$