

4-3B Factoring Short-cuts

previous assignment:
4-3A Worksheet

- quadratic trinomials
- perfect square trinomials
- differences of perfect squares
- A.APR.4

Factoring quadratic trinomials (alternative to guess/check)

quadratic trinomial: $ax^2 + bx + c$

- write trinomial in descending order.
- multiply # = ac , add # = b "what multiplies to give me ac and adds to give me b ?"
- split middle term into 2 terms (make 3 terms into 4 terms)
- continue factoring using grouping techniques.

$$ax^2 + bx + c$$

Handwritten notes: F above a , O above b , L above c . An arrow points from O to b . To the right is a table:

x	$+$
ac	b

$$\begin{pmatrix} 2n+9 & n-1 \\ -9 & +1 \\ +1 & -9 \\ 3 & -3 \\ -3 & 3 \end{pmatrix}$$

$$(2n+4)(n-3)$$

$$2n^2 - 6n + 4n - 12$$

Factor.

1. $x^2 + 5x + 6$ $1x+4x$
 $2x+3x$
 $6x-1x$

$x^2 + 2x + 3x + 6$

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

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

2. $3x^2 - 13x + 10$

$3x^2 - 3x - 10x + 10$

$3x(x-1) - 10(x-1)$

$(3x-10)(x-1)$

3. $-6x^2 + 11x - 3$

$-6x^2 + 9x + 2x - 3$

$-3x(2x-3) + 1(2x-3)$

$(3x-1)(-2x+3)$

$(-3x+1)(2x-3)$

4. $x^4 + 10x^2 - 11$

$x^4 - 1x^2 + 11x^2 - 11$

$x^2(x^2-1) + 11(x^2-1)$

$(x^2+1)(x^2-1)$

$(x^2+1)(x+1)(x-1)$

Factoring perfect square trinomials (short-cut)

- must be a trinomial.
- 1st and 3rd terms must be perfect squares (and positive)
- if $ax^2 + bx + c$, then $\left(\frac{b}{2}\right)^2 = ac$

$(a \pm b)^2$

1st 10 perfect squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

perfect square variables: even degree

5. $x^2 + 6x + 9$

$\sqrt{x^2} \rightarrow x$ $\sqrt{9} \rightarrow 3$

$(x+3)^2$

6. $x^2 - 10x + 25$

$\sqrt{x^2} \rightarrow x$ $\sqrt{25} \rightarrow 5$

$(x-5)^2$

7. $9x^2 + 12x + 4$

$\sqrt{9x^2} \rightarrow 3x$ $\sqrt{4} \rightarrow 2$

$(3x+2)^2$

$\frac{b}{2} = \frac{6}{2} = 3 = 3^2 = 9$

$\frac{b}{2} = \frac{-10}{2} = -5 = (-5)^2 = 25$

$\sqrt[3]{x^6} = x^2 \cdot x^2 \cdot x^2$

$\sqrt[3]{x^6} = x \cdot x \cdot x$

Factoring a difference of perfect squares

- must be two terms
- must be a *difference*
- both terms must be *perfect squares*.

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

$$x^2 - 1$$

8. $a^2 - b^2$

9. $4x^2y^6z^{10} - 9a^6$

10. $2x^2 - 50$

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

$$(2xy^3z^5 - 3a)(2xy^3z^5 + 3a)$$

$$2(x^2 - 25)$$

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

$$x^2 + 25$$

Prime



