Ab $-50,\infty$

Chapter 2 – Polynomial and Rational Expressions

2.3: Factoring Polynomials

This topic *should* be review, but a quick refresher on the basic types of factoring won't hurt you. Really…it won't hurt at all. In fact, it will make you feel all warm and tingly inside. We'll work through some examples from your text (Pg. 102 – 103), together.

A - Common Factoring

inverse of expanding

Expanding

$3x(x-2)$

$= 3x^2 - 6x$

4. Factor.

a) $4x^3 - 6x^2 + 2x$

b) $3x^3y^2 - 9x^2y^4 + 3xy^3$

c) $4a(a+1) - 3(a+1)$

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

b) $3xy^2(x^2 - 3xy^2 + y)$

c) $(a+1)(4a - 3)$

B – Difference of Squares

PATTERN PATTERN PATTERN PATTERN PATTERN

difference

Square$_1$ minus Square$_2$

$= (\text{root}_1 - \text{root}_2)(\text{root}_1 + \text{root}_2)$

6. Factor.

e) $3x^2 - 27(2-x)^2$

b) $4n^2 - 49$

b) $4n^2 - 49$

$= (2n - 7)(2n + 7)$

e) $3x^2 - 27(2-x)^2$

$= 3(x^2 - 9(2-x)^2)$ COMMON FACTOR IF YOU CAN

$= 3(x - 3(2-x))(x + 3(2-x))$ Simplify if you can

$= 3(x - 6 + 3x)(x + 6 - 3x)$

$= 3(4x - 6)(-2x + 6)$

DECOMPOSITION

C – Factoring Trinomials

5. Factor.

a) $x^2 - 5x - 14$

$x \mid +$
$-14 \mid -5$
$-7, 2$

$= x^2 - 7x + 2x - 14$

$= x(x-7) + 2(x-7)$

$= (x-7)(x+2)$

d) $2y^2 + 5y - 7$

$x \mid +$
$-14 \mid +5$
$7, -2$

$= 2y^2 + 7y - 2y - 7$

$= y(2y+7) - 1(2y+7)$

$= (2y+7)(y-1)$

example

eg expand

$(x-2)(3x+7)$

$= 3x^2 + 7x - 6x - 14$

$= 3x^2 + 1x - 14$

$\times \quad + \quad \times$

expand

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

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

$= 4x^2 - 12x + 9$

D – Perfect Square Trinomials

3 TERMS

Factor: a) $x^2 + 12x + 36$

$= (x+6)^2$

b) $2x^3y - 28x^2y^2 + 98xy^3$

$= 2xy(x^2 - 14xy + 49y^2)$

$= 2xy(x - 7y)^2$

3. Factor.

c) $9x^2 - 42x + 49$

$= (3x - 7)^2$

In general: $(a+b)^2 = a^2 + 2ab + b^2$ (square) (square)

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

eg Factor $49x^2 - 14x + 1 = (7x - 1)^2$

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

E – Factoring by Grouping

2. Each expression given can be factored by grouping. Describe how you would group the terms to factor each.

a) $ac + bc - ad - bd$

b) $x^2 + 2x + 1 - y^2$

a) $ac - ad + bc - bd$

$= a(c-d) + b(c-d)$

$= (c-d)(a+b)$

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

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

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

$= ((x+1) - y)((x+1) + y)$

7. Factor.

a) $ax + ay + bx + by$

$= a(x+y) + b(x+y)$

$= (x+y)(a+b)$

d) $1 - x^2 + 6x - 9$

$= 1 - (x^2 - 6x + 9)$

$= 1 - (x-3)^2$

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

$= (4 - x)(-2 + x)$

9. Factor.

factor out a negative!

a) $2x(x-3) + 7(3-x) \Rightarrow -(-3+x)$

$= -(x-3)$

d) $y^2 - 49 + 14x - x^2$

$= 2x(x-3) - 7(x-3)$

$= (x-3)(2x-7)$

$= y^2 - (49 - 14x + x^2)$

$= y^2 - (7-x)^2$

$= (y - (7-x))(y + (7-x))$

Note: $b - a = -(a-b)$

Class/Homework Pg. 102 – 103 Finish # 3, 4, 5, 6, 7, 9 (careful with 4e and 6c, and remember…Common Factoring is your friend!!)