2-3 Factoring Polynomials

(Book 6.4 pg. 353-)

Objectives:

- I can factor a polynomial by GCF, special factoring, and factor by grouping
- I can find multiple representations of factored polynomials

Factor the following:

$1x^2 - 7x + 10$

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

$x^2 + x - 30$

-30

$1 \cdot 30$

$2 \cdot 15$

$3 \cdot 10$

$5 \cdot 6$

$(x-5)(x+6)$

$2x^2 - 3x - 2$

-4

$1 \cdot -4$

$2 \cdot 2$

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

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

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

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

$6x^2 - 7x - 5$

-30

$+$

$(6x^2 + 3x)(10x - 5)$

$3x(2x+1) - 5(2x+1)$

$(2x+1)(3x-5)$

Greatest Common Factors pg. 355-356

(A) $6x^3 + 15x^2 + 6x$

(B) $2x^3 - 20x$

Factor.

$3x^3 + 7x^2 + 4x$

$x(3x^2 + 7x + 4)$

$x[(3x^2 + 3x) + (4x + 4)]$

$x[3x(x+1) + 4(x+1)]$

$x(x+1)(3x+4)$

12
1, 12
2, 6
3, 4

$\frac{4a^4b}{2a^2b} + \frac{8a^3b^3}{2a^2b} - \frac{10a^2b^4}{2a^2b}$

$2a^2b(2a^2 + 4ab^2 - 5b^3)$

$(x+1)(3x^2+4x)$

$(x+1)x(3x+4)$

-10
$1, 10$
$2, 5$

Special Factoring Patterns pg. 355

Remember the factoring patterns you already know:

Difference of two squares: $a^2 - b^2 = (a-b)(a+b)$ $(x^2-4)=(x+2)(x-2)$

Perfect square trinomials: $a^2 + 2ab + b^2 = (a+b)^2$

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

Memorize

There are two other factoring patterns that will prove useful:

Sum of two cubes: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

Difference of two cubes: $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

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

Factor.

$x^3 - 27$ $a=x$ $b=3$

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

$27x^3 + 64$ $a=3x$ $b=4$

$(3x+4)(9x^2-12x+16)$

$8x^3 + 64$ $a=2x$ $b=4$

$(2x+4)(4x^2-8x+16)$

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

$8(x+2)(x^2-2x+4)$

$x^3 + 4$ irreducible nonfactorable

$4x^2 - 36$

$4(x^2-9)$

$4(x+3)(x-3)$

Factoring by Grouping pg. 357

(A) $x^3 + x^2 + x + 1$

Write out the polynomial.	$x^3 - x^2 + x - 1$
Group by common factor.	$(x^3 - x^2) + (x - 1)$
Factor.	$x^2(x - 1) + 1(x - 1)$
Regroup.	$(x^2 + 1)(x - 1)$

(B) $x^4 + x^3 + x + 1$

Factor by Grouping.

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

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

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

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

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

Factor.

$3x^3 + 7x^2 + 4x$

$4a^4b + 8a^3b^3 - 10a^2b^4$