Fantastically Fun Factoring Friday :)

Simply Trinomial Factoring

$1x^2 - x - 72$

$(x-9)(x+8)$

$\_\_ \times \_\_ = -72$

$\_\_ + \_\_ = -1$

$x^6 \cdot x^6 = x^{6+6}$

$= x^{12}$

Difference of squares

$x^2 - 121$

$(x+11)(x-11)$

$x^{12} - 16y^6$

$(x^6)^2 - (4y^3)^2$

$(x^6 - 4y^3)(x^6 + 4y^3)$

Decomposition

1x6
2x3

$6x^2 + 13x + 6$

1x6
2x3

$6 \times 6 = 36$

$\_\_ \times \_\_ = 36$

$\_\_ + \_\_ = 13$

$\underbrace{6x^2 + 9x} + \underbrace{4x + 6}$

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

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

2x1

7x1

$2x^2 - 13x - 7$

$(2x+1)(x-7)$

$a = \pm 1, \pm 2$

$b = \pm 1, \pm 7$

$\frac{b}{a} = \pm 1, \pm 7, \pm \frac{1}{2}, \pm \frac{1}{7}$

Ch 3.3 Day 2 - Specialized Factoring Techniques

Case 1- Common Factors

A) $x^3 - x^2 - 12x$

$x(x^2 - x - 12)$

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

Discriminant

$\Delta = b^2 - 4ac$

if $\Delta < 0$ will not factor!

B) $2x^4 + 4x^3 + 4x^2 + 2x$

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

Rational Root Theorem (RRT)

$P(\frac{b}{a}) = 0$

$P(1) \neq 0$

$P(-1) = -1 + 2 - 2 + 1$
$= 0$

$x = -1$ is a root

$$\begin{array}{r|rrrr} -1 & 1 & 2 & 2 & 1 \\ & \downarrow & -1 & -1 & -1 \\ \hline & 1 & 1 & 1 & 0 \end{array}$$

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

will not factor!

Case 2- The Sum and Difference of Cubes

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

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

A) x^3+27

$(x)^3+(3)^3$

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

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

B) $64x^3+125$

$(4x)^3+(5)^3$

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

$(4x+5)(16x^2-20x+25)$

Case 2- The Sum and Difference of Cubes

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

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

C) $27x^3 - 1$

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

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

$$(3x-1)(9x^2 + 3x + 1)$$

Case 3 – Quartics factored as Quadratic trinomials

A) $x^4 - 5x^2 + 4$

let $m = x^2$

$m^2 - 5m + 4$

$(m-4)(m-1)$

$(x^2-4)(x^2-1)$

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

B) $4x^4 - 37x^2 + 9$

let $m = x^2$

$4m^2 - 37m + 9$

$\_ \times \_ = 36$

$\_ + \_ = -37$

$4m^2 - 36m - m + 9$

$4m(m-9) - 1(m-9)$

$(m-9)(4m-1)$

$(x^2-9)(4x^2-1)$

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

Case 4- Grouping to Find a Common Factor

A) $\underbrace{x^3 - 2x^2}\ \underbrace{-16x + 32}$

$x^2(x-2) - 16(x-2)$

$(x-2)(x^2-16)$

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

B) $\overbrace{x^5 - 5x^4}\ \overbrace{-10x^3 + 50x^2}\ \overbrace{+9x - 45}$

$x^4(x-5) - 10x^2(x-5) + 9(x-5)$

$(x-5)(x^4 - 10x^2 + 9)$

let $x^2 = m$

$(x-5)(m^2 - 10m + 9)$

$(x-5)(m-9)(m-1)$

$(x-5)(x^2-9)(x^2-1)$

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

HW: pg 134 #10,11,13,15, Sheet

Date:________________________ Block:________ Name:________________________#____

Factoring

1. Factor fully using the rational root theorem, or one of the special factoring techniques discussed in class.

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

b) $2x^3 + x^2 - 13x + 6$

c) $x^3 + x^2 - 16x + 20$

d) $(x-5)(3x^3 - x^2 - 20x - 12)$

e) $x^3 - 4x^2 - 4x + 16$

f) $x^3 - 64$

g) $5a^4 - 135a$

h) $x^3 - 5x^2 - 9x + 45$

i) $x^4 - 13x^2 + 36$

j) $x^4 + 8x^3 - 2x^2 - 16x$

k) $4x^3 - 8x^2 - 25x + 50$

l) $36x^2 - x^4 - 100$

m) $x^4 - x^3 - x + 1$

n) $x^5 - 2x^4 - x^3 + 2x^2 - 12x + 24$