ICA: Monday Oct 17th
(not including polynomial inequalities)

Test: Friday Oct 21ST

5. Factor fully.

e) $P(k) = k^5 + 3k^4 - 5k^3 - 15k^2 + 4k + 12$

Apply

7. Determine the value(s) of k so that the binomial is a factor of the polynomial.

a) $x^2 - x + k$, $x - 2$ $P(2)=0$

b) $x^2 - 6x - 7$, $x + k$ $P(-k)=0$

c) $x^3 + 4x^2 + x + k$, $x + 2$

d) $x^2 + kx - 16$, $x - 2$

$$2^2 - 2 + k = 0$$
$$4 - 2 + k = 0$$
$$2 + k = 0$$
$$k = -2$$

$$(-k)^2 - 6(-k) - 7 = 0$$
$$k^2 + 6k - 7 = 0$$
$$(k+7)(k-1) = 0$$
$$k+7=0 \quad k-1=0$$
$$k=-7 \quad k=1$$

Factoring a Trinomial

Decomposition: $6x^2 \underline{+11x} - 10 = 0$

ac
$6 \cdot -10$
-60

1	60
2	30
3	20
4	15

$6x^2 \underline{+15x -4x} - 10 = 0$

$3x(2x+5) - 2(2x+5) = 0$

$(2x+5)(3x-2) = 0$

LC and constant are prime numbers we can use guess + check

$7x^2 + 20x - 3$

$(7x-1)(x+3)$

Difference of Squares

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

$$4x^2 - 9 = (2x+3)(2x-3)$$

$$-16x^4 + 1 = 1 - 16x^4 = (1+4x^2)(1-4x^2)$$

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

Ch 3.3 Day 2 - Specialized Factoring Techniques

Case 1- Common Factors

ALWAYS look for common factors first.

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

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

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

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

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

$x = -1$ is a root

$(x+1)$ is a factor

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

$x^2 + x + 1$

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

Case 2- The Sum and Difference of Cubes

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

same opp always +

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

same opp always +

A) $x^3 + 27$

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

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

B) $64x^3 + 125$

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

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

C) $27x^3 - 1$

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

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

Case 3 – Quartics factored as Quadratic trinomials

Quadratics in Disguise

square of other term

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

$m = x^2$

$m^2 - 5m + 4$

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

remember $m = x^2$

$(x^2-4)(x^2-1)$ ← diff of squares

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

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

$m = x^2$

$9 \cdot 4$

36

$4m^2 - \underline{37m} + 9$

361

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

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

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

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

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

Case 4- Grouping to Find a Common Factor

*only works with an even # of terms

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

$x^3(x^2-5x-10)$ nothing common

groups of 3 didn't work

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

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

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

$\downarrow$

Quadratic in Disguise.

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

$m=x^2$

$m^2-10m+9$

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

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

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

Same idea

x^6-7x^3+6

$m=x^3$

m^2-7m+6

HW: pg 134 # 10, 11, 13, 15 and <u>sheet</u>

FACTORING

↓

Common Factors

2 terms ← Common Factors → 3 terms

2 terms

a^2-b^2

a^3+b^3

a^3-b^3

More than 3 terms

- Factor by grouping
- rational root theorem/ Synthetic division.

3 terms

Quadratic

Quadratic in disguise