WEEK 2 NOTES
8-24-17

FACTORING POLYNOMIALS

I. GROUPING → 4 TERMS

ex/ $\underbrace{5x^3-10x^2}_{+5x^2}\ \underbrace{-3x+6}_{\div -3}$

* FACTOR SOMETHING FROM EACH GROUP.

keep from symbol $5x^3-10x^2-3x+6$

$5x^2(x-2)\ \pm 3(x-2)$

[(x-2) multiplies to both $(5x^2 \& -3)$]

★ FACTOR OUT THE MATCHING GROUP.

$\boxed{(x-2)(5x^2-3)}$

MATCH LEFTOVERS

ex/ $\underbrace{6x^3-15x^2}_{\div 3x^2}\ \underbrace{+10x-25}_{\div +5}$

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

MATCHING GROUP

$\boxed{(2x-5)(3x^2+5)}$

ex/ $6x^3+3x^2+16x+8$

$3x^2(2x+1)+8(2x+1)$

$(2x+1)(3x^2+8)$

II. Special Factoring → 2 terms (only works with squares & cubes)

A. Difference of Squares

a^2-b^2

Step 1: Ask are they both squares? are they subtracting?

Step 2: If both are yes, FIND ROOTS. oo

Exponent DIVIDE by 2

ex/ $4x^2-9$

roots: $\sqrt{4x^2}=2x^{2\div 2}=2x,\ \sqrt{9}=3$

STEP 3: REWRITE AS $(s+r)(s-r)$

ex/ $4x^2-9=\boxed{(2x+3)(2x-3)}$

B. Sum/Difference of Cubes

Step 1: Ask are they cubes? ooo

Exponent DIVIDE by 3

Step 2: If yes, FIND ROOTS

ex/ x^3+27

roots: $\sqrt[3]{x^3}=x^{3\div 3}=x,\ \sqrt[3]{27}=3$

Step 3: rewrite as

$(root_1 \overset{\pm}{\text{or}} root_2)((R_1)^2 \overset{\mp}{\text{or}} (R_1)(R_2)+(R_2)^2)$

$\pm$: SAME AS ORIGINAL; $\mp$: CHANGE; $+$: PLUS

ex/ x^3+27

roots: $\sqrt[3]{x^3}=x \qquad \sqrt[3]{27}=3$

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

SAME CHANGE PLUS

$\boxed{(x+3)(x^2-3x+9)}$

ex/ $8x^6-1$

roots: $\sqrt[3]{8x^6}=(2)(x^{6\div 3})=2x^2 \qquad \sqrt[3]{1}=1$

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

Same Change plus

$\boxed{(2x^2-1)(4x^4+2x^2+1)}$