MA115 WK 1 TUE _____

Today: Ch 0 : Factoring Quadratics / Algebraic Fractions / Rational Expressions

Factoring Quadratic: $Ax^2 + Bx + C$

use the AC-method:

(ex) $x^2 - 4x - 32$

① decompose the B-term into factors of A·C

$\pm 1, \pm 2, \pm 4, \pm 8, \pm 16$

② $x^2 - 8x + 4x - 32$

③ Factor by grouping:

$x(x-8) + 4(x-8) = (x-8)(x+4)$

Factoring By Grouping

use w/ Four pieces

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

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

typically there's one more step:

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

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

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

Common Form

ex $x^2 - 6x + 9 = (x-3)^2$ perfect square

ex $a^2 - b^2 = (a-b)(a+b)$ difference of squares

FOIL

$a^2 + \underbrace{ab - ba}_{=0} - b^2$

ex $6x^2 - 17x - 3 = 6x^2 + x - 18x - 3$

AC: -18
Factors: $1, 3, 6, 18$

$= x(6x+1) - 3(6x+1) = (6x+1)(x-3)$ ✓

idea: $xM - 3M = M(x-3)$

ex $16x^2 - 25y^2 = 4^2x^2 - 5^2y^2 = (4x)^2 - (5y)^2 = (4x-5y)(4x+5y)$

diff. of □'s

check: FOIL your ans

$16x^2 + \underbrace{20xy - 20yx}_{=0} - 25y^2$

Algebraic Fractions

Key: + & − behave differently than * & ÷ re: cancellations

(ex) $\frac{A \cdot B}{C \cdot B^4} = \frac{A}{C \cdot B^4 \cdot B^{-1}}$

legal b/c

$$B = \frac{1}{B^{-1}}$$

(ex) $\frac{A+B}{C \cdot B^4}$

nothing to be done

(ex) $\frac{A+B}{C+B^4}$

(ex) $\frac{x^{-3}\, y^{-4}}{x^5\, y^{-7}} = \frac{\frac{1}{x^3}\, y^{-4}}{x^5\, y^{-7}}$

$= \frac{y^{-4}}{x^3 x^5 y^{-7}} = \frac{y^7 y^{-4}}{x^8} = \frac{y^3}{x^8}$

($x^3 x^5 = x^8$)

(ex) $\frac{x^{-3} + y^5}{x^2 y}$