Algebra 2H Extra Notes Section 3-4

Factoring by Grouping

ex. 1 $x^2y^2 - 3x^2 - 4y^2 + 12$

$(x^2y^2 - 3x^2) + (-4y^2 + 12)$

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

$a \quad c \quad -b \quad c \quad = (a-b)c$

ex. 2 $4x^4 + 4x^3 - 8x^2 - 8x$

$(4x^4 + 4x^3) + (-8x^2 - 8x)$

$4x^3(x+1) - 8x(x+1) = (4x^3 - 8x)(x+1)$

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

Factoring Cubes

cube roots

prime

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

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

ex. 3 $x^3 + 64$

$(x)^3 + (4)^3 = (x+4)(x^2 - 4x + 16)$

$a \quad b \quad 4^2$

Roots

ex. 4 $512x^6 - y^3$

$(8x^2)^3 - (y)^3 = (8x^2 - y)(64x^4 + 8x^2y + y^2)$

$a \quad b$

$\sqrt[3]{x} \times \sqrt{y} = \sqrt[3]{64}$

$x^{1/3} = 64\boxed{\wedge}$ $(1 \div 3)$

Examples: factor completely

ex. 5 $30x^4 + 5x^2 - 60$

$-72x^4 = \text{prod}$

$5(6x^4 + x^2 - 12) = 5(2x^2 + 3)(3x^2 - 4)$

$9x^2$

$-8x^2$

Sum $x^2 = -8x^2, 9x^2$

ex. 6 $25x^8 - 30x^4 + 9$

$(5x^4)^2 - 2(15x^4) + 3^2 = (5x^4 - 3)^2$

ex. 7 $3x^{20n} - 48 = 3(x^{20n} - 16) = 3(x^{10n} + 4)(x^{10n} - 4)$

$3(x^{10n} + 4)(x^{5n} - 2)(x^{5n} + 2)$