Algebra 2

Ch. 6 Handout 6.4 (day 1)

Solving Polynomial Equations

Sum and Difference of Cubes

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

$(1st)^3 + (2nd)^3 = ((1st) + (2nd))((1st)^2 - (1st)(2nd) + (2nd)^2)$

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

$(1st)^3 - (2nd)^3 = ((1st) - (2nd))((1st)^2 + (1st)(2nd) + (2nd)^2)$

Factor the equation: $x^3 - 64$

$(1^{st} - 2^{nd})((1^{st})^2 + (1^{st})(2^{nd}) + (2^{nd})^2)$

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

$(x)^3 - (4)^3$

$\boxed{(x-4)(x^2 + 4x + 16)}$

Factor the equation: $27x^3 + 125$

$(1st + 2nd)\left((1st)^2 - (1st)(2nd) + (2nd)^2\right)$

$27x^3 + 125 = (3x + 5)\left((3x)^2 - (3x)(5) + (5)^2\right)$

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

$$\boxed{(3x+5)(9x^2-15x+25)}$$

Solve: $x^3 + 8 = 0$

FACTOR Polynomial First

(1st + 2nd)((1st)^2 − (1st)(2nd) + (2nd)^2)

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

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

$(x+2)(x^2 - 2x + 4) = 0$

Solve polynomial →

$x + 2 = 0$

$x^2 - 2x + 4 = 0$ (a = 1, b = −2, c = 4)

$x = -2$

$x = 1 \pm i\sqrt{3}$

$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(4)}}{2(1)}$

$x = \frac{2 \pm \sqrt{4 - 16}}{2}$

$-1 \cdot 4 \cdot 3$

$x = \frac{2 \pm \sqrt{-12}}{2} = \frac{2 \pm 2i\sqrt{3}}{2}$

$x = \frac{2}{2} \pm \frac{2i\sqrt{3}}{2}$

Solve: $x^4 - 6x^2 - 27 = 0$

$(x^2 - 9)(x^2 + 3) = 0$

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

$x-3=0 \quad x+3=0 \quad x^2+3=0$

$x=3 \quad x=-3 \quad \sqrt{x^2} = \pm\sqrt{-3}$

$x = \pm 3 ; \; x = \pm i\sqrt{3}$

Solve: $27x^3 - 1 = 0$

$(1^{st} - 2^{nd})((1^{st})^2 + (1^{st})(2^{nd}) + (2^{nd})^2)$

$27x^3 - 1 = (3x - 1)((3x)^2 + (3x)(1) + (1^2)) = 0$

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

$(3x-1)(9x^2+3x+1) = 0$

$3x - 1 = 0$

$3x = 1$

$x = \frac{1}{3}$

$9x^2 + 3x + 1 = 0$ (a, b, c)

$x = \frac{-3 \pm \sqrt{(3)^2 - 4(9)(1)}}{2(9)}$

$x = \frac{-3 \pm \sqrt{9-36}}{18}$

$-1 \cdot 9 \cdot 3$

$x = \frac{-3 \pm \sqrt{-27}}{18}$

$x = \frac{-3 \pm 3i\sqrt{3}}{18}$

$x = \frac{-3}{18} \pm \frac{3i\sqrt{3}}{18}$

$x = -\frac{1}{6} \pm \frac{i\sqrt{3}}{6}$

Solve: $x^4 + 3x^2 - 28 = 0$

$(x^2 + 7)(x^2 - 4) = 0$

$(x^2+7)(x-2)(x+2) = 0$

$x^2+7=0 \quad x-2=0 \quad x+2=0$

$\sqrt{x^2} = \pm\sqrt{-7} \quad x=2 \quad x=-2$

$x = \pm i\sqrt{7}, \; x = \pm 2$

Solve: $8x^3 - 1 = 0$

Solve: $x^4 + 11x^2 + 18 = 0$

$(x^2 + 9)(x^2 + 2) = 0$

$x^2 + 9 = 0$ $\quad$ $x^2 + 2 = 0$

$\sqrt{x^2} = \pm\sqrt{-9}$ $\quad$ $\sqrt{x^2} = \pm\sqrt{-2}$

$x = \pm 3i$; $x = \pm i\sqrt{2}$

Assignments:

pg 330 (12, 15, 18, 21, 24, 27, 30, 42, 45, 48, 51, 54, 57)

Algebra 2

Ch. 6 Handout 6.4 (day 2)

Solving Polynomial Equations

Solve: $x^4 + 7x^2 + 6 = 0$

Solve: $216x^3 - 1 = 0$

Solve: $x^4 - 5x^2 + 4 = 0$

Solve: $x^3 - 5x^2 + 3x - 15 = 0$

Solve: $6x^4 + 24x^2 - 30 = 0$

Solve: $t^3 - 6t^2 - 4t + 24 = 0$

Assignment:

Day 2: pg 330 (13, 16, 19, 22, 25, 28, 31, 43, 46, 49, 52, 58)