

# 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:  $x^3 - 64$

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

Solve:  $x^3 + 8 = 0$

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

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

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



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

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

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

$$(x^2 + 6)(x^2 + 1) = 0$$

$$x^2 + 6 = 0 \quad x^2 + 1 = 0$$

$$\sqrt{x^2} = \pm \sqrt{-6}$$

$$\sqrt{x^2} = \pm \sqrt{-1}$$

$$x = \pm i\sqrt{6} ; \quad x = \pm i$$

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

$$(6x)^3 - (1)^3$$

$$(6x - 1)((6x)^2 + (6x)(1) + (1)^2) = 0$$

$$(6x - 1)(36x^2 + 6x + 1) = 0$$

$$6x - 1 = 0$$

$$6x = 1$$

$$\boxed{x = \frac{1}{6}$$

$$x = \frac{-1}{12} \pm \frac{i\sqrt{3}}{12}$$

$$36x^2 + 6x + 1 = 0$$

$$x = \frac{-6 \pm \sqrt{(6)^2 - 4(36)(1)}}{2(36)}$$

$$x = \frac{-6 \pm \sqrt{-108}}{72}$$

$$x = \frac{-6 \pm 6i\sqrt{3}}{72}$$

$$x = \frac{-6}{72} \pm \frac{6i\sqrt{3}}{72}$$

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

$$(x^2 - 4)(x^2 - 1) = 0$$

$$(x - 2)(x + 2)(x - 1)(x + 1) = 0$$

$$x = 2 \quad x = -2 \quad x = 1 \quad x = -1$$

$$x = \pm 2 ; x = \pm 1$$

$$\text{Solve: } x^3 - 5x^2 + 3x - 15 = 0$$

$$\left( \underbrace{x^3}_{x^2} - \underbrace{5x^2}_{x^2} \right) + \left( \underbrace{3x}_3 - \underbrace{15}_3 \right) = 0$$

$$\frac{x^2(x-5)}{(x-5)} + \frac{3(x-5)}{(x-5)} = 0$$

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

$$x-5=0 \quad x^2+3=0$$
$$\sqrt{x^2} = \sqrt{-3}$$

$$\boxed{x=5 ; x=\pm i\sqrt{3}}$$



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

$$6(x^4 + 4x^2 - 5) = 0$$

$$6(x^2 + 5)(x^2 - 1) = 0$$

$$6(x^2 + 5)(x - 1)(x + 1) = 0$$

~~$6 = 0$~~   $x^2 + 5 = 0$

$$\sqrt{x^2} = \sqrt{-5}$$

$$x - 1 = 0 \quad x + 1 = 0$$

$$x = 1 \quad x = -1$$

$$x = \pm i\sqrt{5}; x = \pm 1$$

$$\text{Solve: } t^3 - 6t^2 - 4t + 24 = 0$$

$$\left( \frac{t^3 - 6t^2}{t^2} \right) + \left( \frac{-4t + 24}{-4} \right) = 0$$

$$\frac{t^2(t-6)}{(t-6)} + \frac{-4(t-6)}{(t-6)} = 0$$

$$(t-6)(t^2-4) = 0$$

$$(t-6)(t-2)(t+2) = 0$$

$$\boxed{t=6, t=2, t=-2}$$

## Assignment:

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

