

grades

total  
points

- HW quizzes  $\frac{8}{10}$
- quizzes  $\frac{28}{30}$
- tests  $\frac{50}{60}$

$$\frac{8 + 28 + 50}{10 + 30 + 60}$$

# Polynomials

linear

$2x - 5$

quadratic

$4 - x + 4x^2$

cubic

$x + x^3$

quartic

$x^4 + x^3 - x + 1$

quintic

$1 - x^5$

6<sup>th</sup> - degree

$x^6 - x^4 + x^2$

EX.  $x^2 - 16 = 0$  ← difference of squares

$$\underline{(x + 4)} \underline{(x - 4)} = 0$$

$$\underline{x + 4 = 0} \quad \text{OR} \quad \underline{x - 4 = 0}$$

zero product property

(ZPP)

$$\boxed{x = -4 \quad \text{OR} \quad x = 4}$$

zeros of the polynomial

# Cubic Polynomials

EX.  $x^3 - 8 = 0$  ← difference of cubes

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

$x-2=0$  or

$x^2+2x+4=0$

$x_1 = 2$

$x_2 = -1 + i\sqrt{3}$

$x_3 = -1 - i\sqrt{3}$

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

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

$\sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$

quadratic formula

If  $ax^2+bx+c=0$

then

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$$\sqrt{-12} = \sqrt{(-1)(4)(3)}$$

$$\sqrt{-1} = i$$

$$= i \cdot 2\sqrt{3}$$

$$= \sqrt{-12} = 2i\sqrt{3}$$

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

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

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

# Factoring Patterns

- Difference of Squares

$$a^2 - b^2 = (a - b)(a + b)$$

EX.

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

- Difference of Cubes

$$a^3 - b^3 = (\underline{a} - \underline{b})(\underline{a}^2 + \underline{a}b + \underline{b}^2)$$

EX.

$$8x^3 - 27 = \underbrace{(2x - 3)}_{\uparrow} (4x^2 + 6x + 9)$$

$\uparrow$   $\uparrow$

- Sum of squares

$$a^2 + b^2 \quad \text{Does not factor}$$

~~$$x^2 + 4$$~~

- Sum of cubes

$$a^3 + b^3 = \underbrace{(a + b)}_{\uparrow} \underbrace{(a^2 - ab + b^2)}_{\uparrow}$$

Ex.

$$64x^3 + 8 = \underbrace{(4x + 2)}_{\uparrow} \underbrace{(16x^2 - 8x + 4)}_{\uparrow}$$