

## More Factoring & Solving Polynomials

Ex 1. Solve by completely factoring  $x^4 + x^3 + x^2 + 3x - 6 = 0$  \*\*hint find all the possible zeros then graph to find the 1st\*\*

① P.Z. =  $\pm \left( \frac{1, 2, 3, 6}{1} \right) = \pm 1, \pm 2, \pm 3, \pm 6$

② from calc.  $x=1$   $x=-2$

$$\begin{array}{r|rrrrr} 1 & 1 & 1 & 1 & 3 & -6 \\ & \downarrow & & & & \\ \hline & 1 & 2 & 3 & 6 & 0 \end{array} \quad \checkmark$$

$$\begin{array}{r|rrrr} -2 & 1 & 2 & 3 & 6 \\ & \downarrow & & & \\ \hline & 1 & 0 & 3 & 0 \end{array} \quad \checkmark$$

③ factors

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

④ zeros

$$\boxed{x=1}, \boxed{x=-2}$$

$$x^2+3=0$$

$$x^2 = -3$$

$$x = \pm \sqrt{-3}$$

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

Ex 2: Solve by completely factoring  $6x^4 + 23x^3 - 8x^2 - 17x - 4 = 0$  \*\*hint find all the possible zeros then graph to find the 1st\*\*

① P.Z. =  $\pm \left( \frac{1, 2, 4}{1, 2, 3, 6} \right) = \pm 1, \pm 2, \pm 4, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{1}{6}$

② from calc.  $x=1$ ,  $x=-4$

$$\begin{array}{r|rrrrr} 1 & 6 & 23 & -8 & -17 & -4 \\ & \downarrow & & & & \\ \hline & 6 & 29 & 21 & 4 & 0 \end{array} \quad \checkmark$$

$$\begin{array}{r|rrrr} -4 & 6 & 29 & 21 & 4 \\ & \downarrow & & & \\ \hline & 6 & 5 & 1 & 0 \end{array} \quad \checkmark$$

③ factors

$$(x-1)(x+4)(6x^2+5x+1) \quad \begin{matrix} ac=6 \\ b=5 \end{matrix}$$

$$6x^2+3x+2x+1$$

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

$$(x-1)(x+4)(2x+1)(3x+1)$$

④ zeros

$$x=1, x=-4, x=-\frac{1}{2}, x=-\frac{1}{3}$$