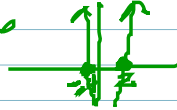


### 6.8 Rational Zero Theorem (pg 393)

Ex #3:  $f(x) = 5x^4 - 8x^3 + 41x^2 - 72x - 36$

$$\begin{array}{r|rrrrrr} 2 & 5 & -8 & 41 & -72 & -36 \\ & \downarrow & 10 & 4 & 90 & 36 \\ \hline -0.4 & 5 & 2 & 45 & 18 & 0 \\ & \downarrow & -2 & 0 & -18 & \\ \hline & 5 & 0 & 45 & 0 & \end{array}$$



$$5x^2 + 45 = 0$$

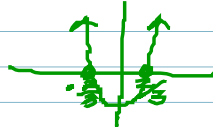
$$\begin{array}{r} +45 & -45 \\ \hline \end{array}$$

$$\frac{5x^2}{5} = \frac{-45}{5} \quad \boxed{X = -0.4 \text{ and } 3}$$

$$\sqrt{x^2} = \sqrt{-9} \quad \boxed{X = \pm 3i}$$

3A:  $9x^4 + 5x^2 - 4$

$$\begin{array}{r|rrrrr} 3 & 9 & 0 & 5 & 0 & -4 \\ & \downarrow & 6 & 4 & 0 & - \\ \hline -3 & 9 & 6 & 9 & 6 & 0 \\ & \downarrow & -6 & 0 & -6 & \\ \hline & 9 & 0 & 9 & & \end{array}$$



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

$$\begin{array}{r} -9 & -9 \\ \hline \end{array}$$

$$\frac{9x^2}{9} = \frac{-9}{9}$$

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

$$\boxed{X = \pm i}$$

$$\boxed{X = \pm 2/3}$$

3B:  $2x^4 - 5x^3 + 20x^2 - 45x + 18$

$$\begin{array}{r|rrrrrr} 2 & 2 & -5 & 20 & -45 & 18 \\ & \downarrow & 4 & -2 & 36 & -18 \\ \hline -0.5 & 2 & -1 & 18 & -9 & 0 \\ & \downarrow & +1 & 0 & 9 & \\ \hline & 2 & 0 & 18 & 0 & \end{array}$$

$$2x^2 + 18 = 0$$

$$\begin{array}{r} -18 & -18 \\ \hline \end{array}$$

$$\frac{2x^2}{2} = \frac{-18}{2}$$

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

$$\boxed{X = \pm 3i}$$

$$\boxed{X = 0.5 \text{ and } 3}$$

# 6.8 Rational Zero Theorem (pg 393)

Ex #3:  $f(x) = 5x^4 - 8x^3 + 41x^2 - 72x - 36$

$$\begin{array}{r|rrrrr} 2 & 5 & -8 & 41 & -72 & -36 \\ & \downarrow & 10 & 4 & 90 & 36 \\ \hline -4 & 5 & 2 & 45 & 18 & 0 \\ & \downarrow & -2 & 0 & -18 & \\ \hline & 5 & 0 & 45 & 0 & \end{array}$$



$$5x^2 + 45 = 0$$

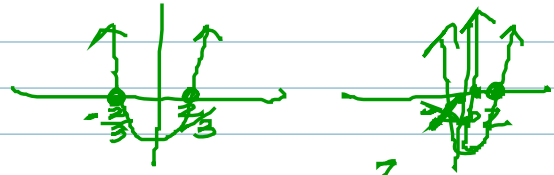
$$\begin{array}{r} +45 \\ -45 \end{array}$$

$$\frac{5x^2}{5} = \frac{-45}{5} \quad \boxed{x = -4 \text{ and } 2}$$

$$\sqrt{x^2} = \sqrt{-9} \quad \boxed{x = \pm 3i}$$

3A:  $9x^4 + 5x^2 - 4$

$$\begin{array}{r|rrrrr} 3 & 9 & 0 & 5 & 0 & -4 \\ & \downarrow & 6 & 4 & 0 & - \\ \hline -3 & 9 & 6 & 9 & 6 & 0 \\ & \downarrow & -6 & 0 & - & \\ \hline & 9 & 0 & 9 & & \end{array}$$



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

$$\begin{array}{r} -9 \\ -9 \end{array}$$

$$\frac{9x^2}{9} = \frac{-9}{9}$$

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

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

$$\boxed{x = \pm 2/3}$$

3B:  $2x^4 - 5x^3 + 20x^2 - 45x + 18$

$$\begin{array}{r|rrrrr} 2 & 2 & -5 & 20 & -45 & 18 \\ & \downarrow & 4 & - & 36 & -18 \\ \hline \pm 5 & 2 & -1 & 18 & -9 & 0 \\ & \downarrow & +1 & 0 & 9 & \\ \hline & 2 & 0 & 18 & 0 & \end{array}$$

$$2x^2 + 18 = 0$$

$$\begin{array}{r} -18 \\ -18 \end{array}$$

$$\frac{2x^2}{2} = \frac{-18}{2}$$

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

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

$$\boxed{x = 5 \text{ and } 2}$$