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$$(x+2)\big(x-(1-2i)\big)\big(x-(1+2i)\big)$$
$$\big(x-(1-2i)\big)\big(x-(1+2i)\big)$$

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

$$x^2 - x - 2xi - x + 2xi + 5$$

$$x^2 - 2x + 5$$

$$(x+2)(x^2 - 2x + 5)$$

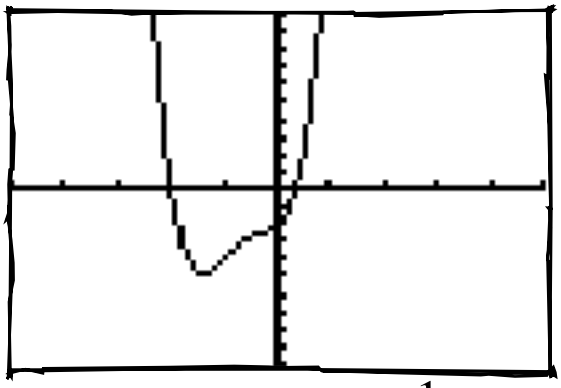
$$x^3 - 2x^2 + 5x + 2x^2 - 4x + 10$$

$$x^3 + x + 10$$

30 $f(x) = 3x^4 + 8x^3 + 6x^2 + 3x - 2$

$p = -2, q = 3$

$$\frac{p}{q} = \pm 1, \pm 2, \pm \frac{1}{3}, \pm \frac{2}{3}$$



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

Synthetic Division

$$\begin{array}{r|rrrrr} -2] & 3 & 8 & 6 & 3 & -2 \\ & & -6 & -4 & -4 & 2 \\ \hline \frac{1}{3}] & 3 & 2 & 2 & -1 & 0 \\ & & 1 & 1 & 1 & \\ \hline & 3 & 3 & 3 & 0 & \end{array}$$

$3x^2+3x+3=0$ Divide by 3

$x^2+x+1=0$

$$\frac{-1\pm\sqrt{1-4(1)(1)}}{2}=\frac{-1\pm i\sqrt{3}}{2}$$

$$x=-2,\frac{1}{3},\frac{-1\pm i\sqrt{3}}{2}$$

Using Synthetic Division with complex roots.

$z=1+2i$

$f(x)=4x^4+17x^2+14x+65$

$$\begin{array}{r|rrrrr} 1-2i] & 4 & 0 & 17 & 14 & 65 \\ & & 4-8i & -12-16i & -27-26i & -65 \\ \hline 1+2i] & 4 & 4-8i & 5-16i & -13-26i & 0 \\ & & 4+8i & 8+16i & -13+26i & \\ \hline & 4 & 8 & 13 & 0 & \end{array}$$

Finish with the Quadratic Formula.

$4x^2+8x+13=0$

$$\frac{-8\pm\sqrt{64-4(4)(13)}}{2(4)}=\frac{-8\pm\sqrt{-144}}{8}=\frac{-8\pm12i}{8}=\frac{-2\pm3i}{2}$$

Homework:
pg. 234-235
#33, 36, 39, 42, 43, 46