3M #19

$$x^4 - 4x^3 + 5x^2 - 4x + 4 = 0$$

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

$z = i$

$z^2 = -1$

$$\boxed{(x^2+1)(x-2)^2}$$

$\underbrace{z^2+1}_{\text{factor}} = 0$

$$
\begin{array}{r l}
 & x^2 - 4x + 4 \\
x^2+1 \,) & \cancel{x^4} - 4x^3 + 5x^2 - 4x + 4 \\
 & -\cancel{x^4} \qquad\quad - x^2 \\
\hline
 & -\cancel{4x^3} + 4x^2 - \cancel{4x} + 4 \\
 & +\cancel{4x^3} \qquad\quad + \cancel{4x} \\
\hline
 & 4x^2 + 4 \\
 & -4x^2 - 4 \\
\hline
 & 0
\end{array}
$$

3d #1e

$$x = -1 - 3i$$

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

$$x^2 + 2x + 1 = -9$$

$$\underline{x^2 + 2x + 10} = 0$$

$\pm 1, \pm 2, \pm 5, \pm 10$
$\pm \frac{1}{2}, \pm \frac{5}{2}$

$-\frac{1}{2}$	2	3	17	-12	-10
		-1	-1	-8	10
	2	2	16	-20	0

$$2\left(x + \tfrac{1}{2}\right)\tfrac{1}{2}\left(2x^3 + 2x^2 + 16x - 20\right)$$

$$(2x+1)(x^3 + x^2 + 8x - 10)$$

Find the factor that gives us

$$x = -3 + 2i$$

$$(x+3)^2 = (2i)^2$$

$$x^2 + 6x + 9 = -4$$

$$\underline{x^2 + 6x + 13} = 0$$

3N
#1e

$$\cancel{3}x^3 - \frac{2}{3}x^2 - \frac{5}{3}x - \frac{4}{3}$$

opp sum

$x_1 + x_2 + x_3$

opp of $x_1 \cdot x_2 \cdot x_3$

$x_1 x_2 + x_1 x_3 + x_2 x_3$

#2

$$x^4 - 3x^3 + 2x^2 - 4x - 6$$

opp

$x_1 + x_2 + x_3 + x_4$

opp of

$x_1x_2x_3 + x_1x_2x_4 + x_1x_3x_4 + x_2x_3x_4$

$x_1x_2x_3x_4$

$x_1x_2 + x_1x_3 + x_1x_4 + x_2x_3 + x_2x_4 + x_3x_4$

$$(x_1 + x_2 + x_3)^2 = x_1^2 + x_2^2 + x_3^2 + 2(x_1x_2 + x_1x_3 + x_2x_3)$$

$$\left(\frac{2}{3}\right)^2 = x_1^2 + x_2^2 + x_3^2 + 2\left(\frac{-5}{3}\right)$$

$$\frac{4}{9} + \frac{\cancel{10}\,30}{\cancel{3}\,9} = x_1^2 + x_2^2 + x_3^2$$

$$9\left(\frac{34}{9}\right) = \underline{34}$$

HW quiz 8/28

① $\sqrt{7+24i}$

② If $x^3-7x^2+8x-9=0$,

then $x_1x_2+x_1x_3+x_2x_3 = \boxed{}$

Cramer's Rule

$$\begin{cases} 2x - y = 1 \\ x + 3y = 11 \end{cases}$$

determinants

$$\underbrace{\det\begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}}_{\text{matrix of coefficients}} = 7 = D \qquad 6 - -1$$

$$X = \frac{D_x}{D} = \frac{14}{7}$$

$$\boxed{x = 2}$$

$$D_x = \det\begin{pmatrix} 1 & -1 \\ 11 & 3 \end{pmatrix} = 14 \qquad 3 - -11$$

$$22 - 1$$

$$D_y = \det \begin{pmatrix} 2 & 1 \\ 1 & 11 \end{pmatrix} = 21$$

$$y = \frac{D_y}{D} = \frac{21}{7} = 3$$

$$\boxed{y = 3}$$

$$\begin{cases} 2x + (3-i)y = 3 \\ ix + (1+2i)y = 2i \end{cases}$$

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

$$D = \det \begin{pmatrix} 2 & 3-i \\ i & 1+2i \end{pmatrix} = 1 + i$$

$$x = \frac{1}{1+i}$$

$$(3+6i) - (6i+2)$$

$$D_x = \det \begin{pmatrix} 3 & 3-i \\ 2i & 1+2i \end{pmatrix} = 1$$

$$\underbrace{\frac{1}{1+i}}\cdot\frac{1-i}{1-i}=\frac{1-i}{1+1}$$

$a+b \longleftrightarrow a-b$
conjugates

$$\boxed{x=\frac{1}{2}-\frac{1}{2}i}$$

$$4i \quad - \quad 3i$$

$$D_y = \det\begin{pmatrix} 2 & 3 \\ i & 2i \end{pmatrix} = i$$

$$y=\frac{i}{1+i}\cdot\frac{1-i}{1-i}=\frac{1+i}{2}$$

$$\boxed{y=\frac{1}{2}+\frac{1}{2}i}$$

HW **3R** #1

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