

K/P #3.

$$\textcircled{1} \sqrt[3]{\frac{-4+4i}{2+3i}} = \sqrt[3]{\frac{(4i-4)(2-3i)}{4+9}} = \sqrt[3]{\frac{8i-8+12+12i}{13}} = \sqrt[3]{\frac{4+20i}{13}}$$

$$= \sqrt[3]{\frac{4\sqrt{26}}{13}} \left( \frac{1}{\sqrt{26}} + \frac{5}{\sqrt{26}}i \right)$$

"cos  $\varphi \Rightarrow \varphi = \arccos \frac{1}{\sqrt{26}}$ "

$$\sqrt[3]{z} = \sqrt[3]{p} \left( \cos \frac{\varphi+2\pi k}{3} + i \sin \frac{\varphi+2\pi k}{3} \right)$$

$k=0, 1, 2$

$k=0: \sqrt[3]{\frac{-4+4i}{2+3i}} = \sqrt[3]{\frac{4\sqrt{26}}{13}} \left( \cos \frac{\arccos \frac{1}{\sqrt{26}}}{3} + i \sin \frac{\arccos \frac{1}{\sqrt{26}}}{3} \right) \approx 0,42393 + i \cdot 0,5637$

oder

$$\textcircled{2} \begin{bmatrix} 1 & -1 & -2 & -1 & -3 \\ 1 & 0 & -1 & -2 & -4 \\ -3 & 1 & 5 & 6 & 13 \\ 6 & -1 & -9 & -13 & -27 \\ -14 & 4 & 22 & 28 & 60 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & -1 & -2 & -4 \\ 0 & -1 & -1 & 1 & 1 \\ 0 & 1 & 2 & 0 & 1 \\ 0 & -1 & -3 & -1 & -3 \\ 0 & 4 & 8 & 0 & 4 \end{bmatrix} \sim$$

$$\sim \begin{bmatrix} 1 & 0 & -1 & -2 & -4 \\ 0 & 1 & 2 & 0 & 1 \\ 0 & 0 & -1 & -1 & -2 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & -1 & -2 & -4 \\ 0 & 1 & 2 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{cases} X_1 - X_3 = 2X_4 + 4X_5 \\ X_2 + 2X_3 = -X_5 \\ X_3 = -X_4 - 2X_5 \end{cases}$$

$X_4=0, X_5=1: \underline{X}_1 = (2 \ 3 \ -2 \ 0 \ 1)^T$

$X_4=1, X_5=0: \underline{X}_2 = (1 \ 2 \ -1 \ 1 \ 0)^T$

$$\textcircled{3} \begin{bmatrix} 1 & 0 & 1 & -1 & 3 & 0 \\ 1 & 0 & 1 & -1 & 4 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 4 & -2 & -3 & 0 & 0 \end{bmatrix} \sim \begin{bmatrix} 1 & 0 & 1 & -1 & 3 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & -1 & 2 & 1 & -3 & 0 \\ 0 & 4 & -2 & -3 & 0 & 0 \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & 0 & 1 & -1 & 3 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 2 & 1 & -2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\begin{cases} b_1 - b_2 + 3b_3 + b_5 = 0 \\ 2b_1 + 2b_3 + b_5 = 0 \end{cases} \begin{bmatrix} 1 & -1 & 3 & 0 & 1 \\ 2 & 0 & 3 & 1 & 0 \end{bmatrix}$$

$$\sim \begin{bmatrix} 1 & -1 & 3 & 0 & 1 \\ 0 & 2 & -3 & 1 & -2 \end{bmatrix}$$

$$\begin{cases} b_1 - b_2 = -3b_3 - b_5 \\ 2b_1 = 4b_3 - b_5 + 2b_2 \end{cases}$$

$$b_1=1, b_4=b_5=0: \underline{X}_1 = (-1 \ 2 \ 1 \ 0 \ 0)^T$$

$$b_3=0, b_4=1, b_5=0: \underline{X}_2 = (-1 \ -1 \ 0 \ 1 \ 0)^T$$

$$b_3=b_4=0, b_5=1: \underline{X}_3 = (2 \ 5 \ 0 \ 0 \ 1)^T$$



$$\begin{array}{c}
 \textcircled{4} \\
 \left[ \begin{array}{ccccc|c} x & x & -x & 0 & x & -28 \\ x & x & -x & x & x & -35 \\ -2 & -4 & 3 & -3 & -4 & 50 \\ -x & -2 & 2 & -2 & -2 & 25 \\ 2 & 6 & -3 & 5 & 6 & -64 \end{array} \right] \sim \left[ \begin{array}{ccccc|c} x & x & -x & 0 & x & -28 \\ 0 & x & 0 & x & x & -7 \\ 0 & -2 & x & -3 & x & -6 \\ 0 & -x & x & -2 & x & -13 \\ 0 & 4 & -2 & 5 & 4 & -8 \end{array} \right]
 \end{array}$$

$$\sim \left[ \begin{array}{ccccc|c} x & x & -x & 0 & x & -28 \\ 0 & x & 0 & x & x & -7 \\ 0 & 0 & x & -x & 0 & -20 \\ 0 & 0 & x & -x & 0 & -20 \\ 0 & 0 & -x & x & 0 & 20 \end{array} \right] \quad x_4 = x_5 = 0: (-41 -7 -20 0 0)^T$$

$$\textcircled{5} \quad \left[ \begin{array}{ccc|cc} -x & x & 0 & 2 & -x \\ -2 & x & 3 & -x & 2 \\ 7 & -2 & -7 & 3 & -5 \\ -8 & x & 10 & -9 & 10 \end{array} \right] \sim \left[ \begin{array}{ccc|cc} -x & x & 0 & 2 & -x \\ 0 & -2 & 3 & -7 & 5 \\ 0 & 5 & -7 & 17 & -12 \\ 0 & -7 & 10 & -25 & 18 \end{array} \right]$$

$$\sim \left[ \begin{array}{ccc|cc} -x & x & 0 & 2 & -x \\ 0 & x & -x & 3 & -2 \\ 0 & 0 & x & -x & x \\ 0 & 0 & 3 & -4 & 4 \end{array} \right] \sim \left[ \begin{array}{ccc|cc} -x & x & 0 & 2 & -x \\ 0 & x & -x & 3 & -2 \\ 0 & 0 & x & -x & x \\ 0 & 0 & 0 & -x & x \end{array} \right]$$

↑↑↑↑  
A43

Базис системы:  $\vec{v}_1, \vec{v}_2, \vec{v}_3, \vec{v}_4$