

8.50.

 $p(x)$ je 5 stepeno, normiran

$$\alpha + \beta i \Rightarrow \alpha - \beta i$$

$$q(x) = x^2 + 4$$

$$q(x) \mid p(x)$$

$$p(x) = q(x) \cdot t(x)$$

 i je jedan koren $p(x) \Rightarrow -i$ je jedan koren $p(x)$

$$\begin{array}{r} p(x) \\ x-1 \\ \hline -20 \end{array}$$

$$\begin{array}{l} (x-i) \mid p(x) \\ (x+i) \mid p(x) \end{array}$$

$$\begin{array}{l} (x-i)(x+i) \mid p(x) \\ x^2+1 \mid p(x) \end{array}$$

$$\begin{array}{l} q(x) \mid p(x) \\ x^2+1 \mid p(x) \end{array}$$

$$q(x) \cdot (x^2+1) \mid p(x)$$

$$\underbrace{(x^2+4)(x^2+1)}_{4. \text{ stepeno}} \mid \underbrace{p(x)}_{5. \text{ stepeno}}$$

$$p(x) = (x^2+4)(x^2+1)(x-a)$$

$$\begin{array}{l} p(x) \\ x-1 \\ \hline p(1) = -20 \end{array} \quad \begin{array}{l} \uparrow \\ p(1) = 5 \cdot 2 \cdot (1-a) \\ -20 = 10(1-a) \\ -2 = 1-a \\ \hline a = 3 \end{array}$$

$$p(x) = (x+i)(x-i)(x+i)(x-i)(x-3) \text{ mod } \mathbb{C}$$

$$p(x) = \underbrace{(x^2+4)}_{\text{mod } \mathbb{R}} \underbrace{(x^2+1)}_{\mathbb{R}} (x-3)$$

$$\begin{bmatrix} 1 & 2 & 0 & 3 & -5 \\ 2 & -1 & 4 & 0 & 3 \\ -3 & -1 & -4 & -3 & 2 \end{bmatrix} \begin{matrix} \sim -2 \\ \sim 3 \end{matrix} \quad \begin{bmatrix} 1 & 2 & 0 & 3 & -5 \\ 0 & -5 & 4 & -6 & 13 \\ 0 & 5 & -4 & 6 & -13 \end{bmatrix} \begin{matrix} \\ \sim + \end{matrix}$$

$$\sim \begin{bmatrix} 1 & 2 & 0 & 3 & -5 \\ 0 & -5 & 4 & -6 & 13 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$\Rightarrow \text{rang} = 2$

$$\begin{bmatrix} 0 & 1 & 2 & 3 & 5 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix} \xrightarrow{2}$$

$$\begin{bmatrix} 0 & 1 & 2 & 3 & 5 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix} \xrightarrow{2}$$

$$\xrightarrow{2} \begin{bmatrix} 0 & 1 & 2 & 3 & 5 \\ 0 & 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

A red line is drawn through the matrix, starting from the top-left element (0) and ending at the bottom-right element (0), passing through the pivot elements (1, 1, 1, 1, 1) and the zero elements (0, 0, 0, 0, 0). The red line indicates the rank of the matrix is 3.

rank = 3

$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\text{rang} = 2$$

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

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

$$\Rightarrow \text{rang} = 2$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 1 \end{bmatrix} \xrightarrow{-1}$$

\sim

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} \xrightarrow{-1}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$$

$\Rightarrow \text{rang} = 2$

\sim

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

