

E94 11403 / 陳仲謙

1. ①

$$\left[\begin{array}{cccc|c} 1.19 & 2.11 & -100 & 1 & 1.12 \\ 14.2 & -0.112 & 13.2 & -1 & 3.44 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ \rightarrow 15.3 & 0.11 & -13.1 & -1 & 4.16 \end{array} \right] \xrightarrow{\text{②}} \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 14.2 & -0.111 & 13.2 & -1 & 3.44 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ 1.19 & 2.11 & -100 & 1 & 1.12 \end{array} \right]$$

③

$$= \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 0 & \frac{-8189}{38250} & \frac{18634}{765} & \frac{-11}{153} & \frac{-322}{765} \\ \rightarrow 0 & 100 & -99.9 & 1 & 2.15 \\ 0 & \frac{18913}{9000} & \frac{-89083}{900} & \frac{97}{90} & \frac{896}{1125} \end{array} \right] \xrightarrow{\text{④}} \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ 0 & \frac{-8189}{38250} & \frac{18634}{765} & \frac{-11}{153} & \frac{-322}{765} \\ 0 & \frac{18913}{9000} & \frac{-89083}{900} & \frac{97}{90} & \frac{896}{1125} \end{array} \right]$$

⑤

$$= \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ 0 & 0 & \frac{24.14429252}{-0.069954098} & -0.416312064 & \frac{0.7512633889}{-0.7512633889} \\ 0 & 0 & -96.88176811 & 1.056963333 & 0.7512633889 \end{array} \right] \xrightarrow{\text{⑥}} \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ 0 & 0 & 24.14429252 & -0.069954098 & -0.416312064 \\ 0 & 0 & -96.88176811 & 1.056963333 & 0.7512633889 \end{array} \right]$$

⑦

$$= \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ 0 & 0 & -96.88176811 & 1.056963333 & 0.7512633889 \\ 0 & 0 & 24.14429252 & -0.069954098 & -0.416312064 \end{array} \right]$$

⑧

$$= \left[\begin{array}{cccc|c} 15.3 & 0.11 & -13.1 & -1 & 4.16 \\ 0 & 100 & -99.9 & 1 & 2.15 \\ 0 & 0 & -96.88176811 & 1.056963333 & 0.7512633889 \\ 0 & 0 & 0 & 0.1936057027 & -0.2292869146 \end{array} \right] \#$$

$$A = \begin{bmatrix} 3 & -1 & 0 & 0 \\ -1 & 3 & -1 & 0 \\ 0 & -1 & 3 & -1 \\ 0 & 0 & -1 & 3 \end{bmatrix} \quad b = \begin{bmatrix} 2 \\ 3 \\ 4 \\ 1 \end{bmatrix}$$

$\frac{63-8}{51} = \frac{55}{51}$

$$A = LU = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -\frac{1}{3} & 1 & 0 & 0 \\ 0 & -\frac{3}{8} & 1 & 0 \\ 0 & 0 & -\frac{8}{21} & 1 \end{bmatrix} \begin{bmatrix} 3 & 0 & 0 & 0 \\ 0 & \frac{1}{3} & 0 & 0 \\ 0 & 0 & \frac{8}{21} & 0 \\ 0 & 0 & 0 & \frac{21}{8} \end{bmatrix}$$

$$AX = b \Rightarrow LUx = b$$

let $0x = y \Rightarrow Ly = b \Rightarrow$ get y

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ -\frac{1}{3} & 1 & 0 & 0 \\ 0 & -\frac{3}{8} & 1 & 0 \\ 0 & 0 & -\frac{8}{21} & 1 \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \\ Y_4 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \\ 4 \\ 1 \end{bmatrix} \Rightarrow \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \\ Y_4 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ -\frac{1}{3} & 1 & 0 & 0 \\ 0 & -\frac{3}{8} & 1 & 0 \\ 0 & 0 & -\frac{8}{21} & 1 \end{bmatrix}^{-1} \begin{bmatrix} 2 \\ 3 \\ 4 \\ 1 \end{bmatrix} = \begin{bmatrix} \frac{2}{3} \\ \frac{11}{3} \\ \frac{4}{7} \\ \frac{64}{21} \end{bmatrix}$$

$$\begin{bmatrix} 3 & -1 & 0 & 0 \\ 0 & \frac{8}{3} & -1 & 0 \\ 0 & 0 & \frac{21}{8} & -1 \\ 0 & 0 & 0 & \frac{55}{21} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix} = \begin{bmatrix} 2 \\ \frac{11}{3} \\ \frac{43}{8} \\ \frac{64}{21} \end{bmatrix} \Rightarrow \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix} = \begin{bmatrix} \frac{79}{55} \\ \frac{127}{55} \\ \frac{137}{55} \\ \frac{64}{55} \end{bmatrix}$$