

Homework Solutions

Appendix 18
#41, 43

41)

$$\left[\begin{array}{ccc|ccc} 4 & 2 & 3 & 1 & 0 & 0 \\ 2 & 1 & 0 & 0 & 1 & 0 \\ -1 & -2 & 0 & 0 & 0 & 1 \end{array} \right]$$

$2R_2 - R_1$
 $4R_3 + R_1 \rightarrow$

$$\left[\begin{array}{ccc|ccc} 4 & 2 & 3 & 1 & 0 & 0 \\ 0 & 0 & -3 & -1 & 2 & 0 \\ 0 & -6 & 3 & 1 & 0 & 4 \end{array} \right]$$

SWAP R_2 R_3

$$\left[\begin{array}{ccc|ccc} 4 & 2 & 3 & 1 & 0 & 0 \\ 0 & -6 & 3 & 1 & 0 & 4 \\ 0 & 0 & -3 & -1 & 2 & 0 \end{array} \right]$$

$R_3 / -3$

$$\left[\begin{array}{ccc|ccc} 4 & 2 & 3 & 1 & 0 & 0 \\ 0 & -6 & 3 & 1 & 0 & 4 \\ 0 & 0 & 1 & -1/3 & 2/3 & 0 \end{array} \right]$$

$R_1 - 3R_3$
 $R_2 - 3R_3$

$$\left[\begin{array}{ccc|ccc} 4 & 2 & 0 & 2 & -4 & 0 \\ 0 & -6 & 0 & 2 & -4 & 4 \\ 0 & 0 & 1 & -1/3 & 2/3 & 0 \end{array} \right]$$

$R_2 / -6$

$$\left[\begin{array}{ccc|ccc} 4 & 2 & 0 & 2 & -4 & 0 \\ 0 & 1 & 0 & 1/3 & -2/3 & 2/3 \\ 0 & 0 & 1 & -1/3 & 2/3 & 0 \end{array} \right]$$

$R_1 - 2R_2$

$$\left[\begin{array}{ccc|ccc} 4 & 0 & 0 & 4/3 & -8/3 & -4/3 \\ 0 & 1 & 0 & 1/3 & -2/3 & 2/3 \\ 0 & 0 & 1 & -1/3 & 2/3 & 0 \end{array} \right]$$

$R_1 / 4$

$$\therefore A^{-1} = \begin{bmatrix} 1/3 & -2/3 & -1/3 \\ 1/3 & -2/3 & 2/3 \\ -1/3 & 2/3 & 0 \end{bmatrix}$$

$$43) \begin{bmatrix} -1 & 3 & 0 & | & 1 & 0 & 0 \\ 1 & -2 & 1 & | & 0 & 1 & 0 \\ 0 & 1 & 2 & | & 0 & 0 & 1 \end{bmatrix} \quad R1/-1$$

$$\Rightarrow \begin{bmatrix} 1 & -3 & 0 & | & -1 & 0 & 0 \\ \textcircled{1} & -2 & 1 & | & 0 & 1 & 0 \\ \textcircled{0} & 1 & 2 & | & 0 & 0 & 1 \end{bmatrix} \quad \begin{array}{l} R2-R1 \\ \checkmark \end{array}$$

$$\Rightarrow \begin{bmatrix} 1 & -3 & 0 & | & -1 & 0 & 0 \\ 0 & 1 & 1 & | & 1 & 1 & 0 \\ 0 & \textcircled{1} & 2 & | & 0 & 0 & 1 \end{bmatrix} \quad R3-R2$$

$$\Rightarrow \begin{bmatrix} 1 & -3 & 0 & | & -1 & 0 & 0 \\ 0 & 1 & \textcircled{1} & | & 1 & 1 & 0 \\ 0 & 0 & 1 & | & -1 & -1 & 1 \end{bmatrix} \quad R2-R3$$

$$\Rightarrow \begin{bmatrix} 1 & \textcircled{-3} & 0 & | & -1 & 0 & 0 \\ 0 & 1 & 0 & | & 2 & 2 & -1 \\ 0 & 0 & 1 & | & -1 & -1 & 1 \end{bmatrix} \quad R1+3R2$$

$$\begin{bmatrix} 1 & 0 & 0 & | & 5 & 6 & -3 \\ 0 & 1 & 0 & | & 2 & 2 & -1 \\ 0 & 0 & 1 & | & -1 & -1 & 1 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 5 & 6 & -3 \\ 2 & 2 & -1 \\ -1 & -1 & 1 \end{bmatrix}$$