

Practice Assignment - 02

1) $[1, 0, 0], [1, 1, 0], [1, 1, 1]$

↳ $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix} \rightarrow |A| = 1 \Rightarrow \text{independent}$

2) $\begin{bmatrix} 7 & -3 & 11 & -6 \\ -56 & 24 & -88 & 48 \end{bmatrix} \xrightarrow{\substack{R_2 + R_2 \\ + 8R_1}} \begin{bmatrix} 7 & -3 & 11 & -6 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

↳ $\rho(A) \neq \rho(AB) \Rightarrow \text{no sol}^n$

Li. independent

3) $\begin{bmatrix} -1 & 5 & 0 \\ 16 & 8 & -3 \\ 64 & 56 & 9 \end{bmatrix} \xrightarrow{\substack{R_2 + R_2 + 16R_1 \\ R_3 - R_3 - 64R_1}} \begin{bmatrix} -1 & 5 & 0 \\ 0 & 88 & -3 \\ 0 & 24 & 21 \end{bmatrix} \xrightarrow{R_3 + R_3 \cdot \frac{24}{88} R_2} \begin{bmatrix} -1 & 5 & 0 \\ 0 & 88 & -3 \\ 0 & 0 & 21.82 \end{bmatrix}$

$\rho(A) = \rho(B) = n$

↳ Li. Dependent

$$4). \begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & -1 \\ -1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix} \xrightarrow{\substack{R_3 \rightarrow R_3 + R_2 \\ R_2 \rightarrow R_2 - R_1}} \begin{bmatrix} 1 & -1 & 1 \\ 0 & 2 & -2 \\ 0 & 2 & 0 \\ 0 & 1 & 0 \end{bmatrix} \xrightarrow{\substack{R_3 \rightarrow R_3 - 2R_4 \\ R_3 \leftrightarrow R_4}} \begin{bmatrix} 1 & -1 & 1 \\ 0 & 2 & -2 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$r(A) \neq r(AB)$$

Li Independent

$$5). \begin{bmatrix} 2 & -4 \\ 1 & 9 \\ 3 & 5 \end{bmatrix} \xrightarrow{\substack{R_3 \rightarrow R_3 - 2R_1 \\ R_2 \rightarrow R_2 - \frac{1}{2}R_1}} \begin{bmatrix} 2 & -4 \\ 0 & 11 \\ 0 & -22 \end{bmatrix} \xrightarrow{\substack{R_3 \rightarrow R_3 + 2R_2}} \begin{bmatrix} 2 & -4 \\ 0 & 11 \\ 0 & 0 \end{bmatrix}$$

$$r(A) \neq r(AB)$$

Li Independent

$$6). \begin{bmatrix} 3 & -2 & 0 & 4 \\ 5 & 0 & 0 & 1 \\ -6 & 1 & 0 & 1 \\ 2 & 0 & 0 & 3 \end{bmatrix} \xrightarrow{R_2 \rightarrow R_2 - \left(\frac{5}{3}\right)R_1} \begin{bmatrix} 3 & -2 & 0 & 4 \\ 0 & \frac{10}{3} & 0 & -\frac{17}{3} \\ -6 & 1 & 0 & 1 \\ 2 & 0 & 0 & 3 \end{bmatrix} \xrightarrow{\substack{R_3 \rightarrow R_3 - (-2)R_1 \\ R_4 \rightarrow R_4 - \left(\frac{2}{3}\right)R_1}} \begin{bmatrix} 3 & -2 & 0 & 4 \\ 0 & \frac{10}{3} & 0 & -\frac{17}{3} \\ 0 & -3 & 0 & 9 \\ 2 & 0 & 0 & 3 \end{bmatrix} \xrightarrow{R_2 \rightarrow R_2 \cdot \left(\frac{3}{10}\right)} \begin{bmatrix} 3 & -2 & 0 & 4 \\ 0 & 1 & 0 & -\frac{17}{10} \\ 0 & -3 & 0 & 9 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$r(A) \neq r(AB)$$

Li Independent

$$7). \begin{bmatrix} 3 & 4 & 7 \\ 2 & 0 & 3 \\ 8 & 2 & 3 \\ 5 & 5 & 6 \end{bmatrix} \xrightarrow{\substack{R_3 \rightarrow R_3 - 4R_1 \\ R_2 \rightarrow R_2 - \frac{2}{3}R_1 \\ R_4 \rightarrow R_4 - \left(\frac{5}{3}\right)R_1}} \begin{bmatrix} 3 & 4 & 7 \\ 0 & -\frac{8}{3} & -\frac{5}{3} \\ 0 & 2 & -9 \\ 0 & -\frac{5}{3} & -\frac{13}{3} \end{bmatrix} \xrightarrow{R_3 \rightarrow R_3 - \left(\frac{13}{4}\right)R_2} \begin{bmatrix} 3 & 4 & 7 \\ 0 & -\frac{8}{3} & -\frac{5}{3} \\ 0 & 0 & -\frac{41}{4} \\ 0 & -\frac{5}{3} & -\frac{13}{3} \end{bmatrix}$$

$$r(A) \neq r(AB)$$

\downarrow

Li Independent

$$R_4 \rightarrow R_4 - \left(\frac{37}{82}\right)R_3$$

$$\begin{bmatrix} 3 & 4 & 7 \\ 0 & -\frac{8}{3} & -\frac{5}{3} \\ 0 & 0 & -\frac{41}{4} \\ 0 & 0 & 0 \end{bmatrix}$$

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8)
$$\begin{bmatrix} 6 & 0 & 3 & 1 & 4 & 2 \\ 0 & -1 & 2 & 7 & 0 & 5 \\ 12 & 3 & 0 & -19 & 8 & -11 \end{bmatrix}$$

$R_3 \rightarrow R_3 - 2R_1$

$$\begin{bmatrix} 6 & 0 & 3 & 1 & 4 & 2 \\ 0 & -1 & 2 & 7 & 0 & 5 \\ 0 & 3 & -6 & -21 & 0 & -15 \end{bmatrix}$$

$R_3 \rightarrow R_3 + 3R_2$

$$\begin{bmatrix} 6 & 0 & 3 & 1 & 4 & 2 \\ 0 & -1 & 2 & 7 & 0 & 5 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Li Independent

$\rho(A) \neq \rho(AB)$