⑥ a)

$$\begin{bmatrix} 3 & 4 & -1 & | & 1 & 0 & 0 \\ 1 & 0 & 3 & | & 0 & 1 & 0 \\ 2 & 5 & -4 & | & 0 & 0 & 1 \end{bmatrix} \longrightarrow \begin{bmatrix} 3 & 4 & -1 & | & 1 & 0 & 0 \\ 0 & -\frac{4}{3} & \frac{10}{3} & | & -\frac{1}{3} & 1 & 0 \\ 0 & \frac{7}{3} & -\frac{10}{3} & | & -\frac{2}{3} & 0 & 1 \end{bmatrix}$$

ADD $-\frac{1}{3}$① to ②

ADD $-\frac{2}{3}$① to ③

$$\longrightarrow \begin{bmatrix} 1 & \frac{4}{3} & -\frac{1}{3} & | & \frac{1}{3} & 0 & 0 \\ 0 & 1 & -\frac{5}{2} & | & -\frac{1}{4} & -\frac{3}{4} & 0 \\ 0 & \frac{7}{3} & -\frac{10}{3} & | & -\frac{2}{3} & 0 & 1 \end{bmatrix} \longrightarrow \begin{bmatrix} 1 & 0 & 3 & | & 0 & 1 & 0 \\ 0 & 1 & -\frac{5}{2} & | & -\frac{1}{4} & -\frac{3}{4} & 0 \\ 0 & 0 & \frac{5}{2} & | & -\frac{1}{4} & \frac{7}{4} & 1 \end{bmatrix}$$

MULT ① by $\frac{1}{3}$

MULT ② by $-\frac{3}{4}$

ADD $-\frac{4}{3}$② to ①

ADD $-\frac{7}{3}$② to ③

$$\longrightarrow \begin{bmatrix} 1 & 0 & 3 & | & 0 & 1 & 0 \\ 0 & 1 & 0 & | & -1 & 1 & 1 \\ 0 & 0 & 1 & | & -\frac{1}{2} & \frac{7}{10} & \frac{2}{5} \end{bmatrix} \longrightarrow \begin{bmatrix} 1 & 0 & 0 & | & \frac{3}{2} & -\frac{11}{10} & -\frac{6}{5} \\ 0 & 1 & 0 & | & -1 & 1 & 1 \\ 0 & 0 & 1 & | & -\frac{1}{2} & \frac{7}{10} & \frac{2}{5} \end{bmatrix}$$

ADD ③ to ②

MULT ② by $\frac{2}{5}$

ADD $-3$③ to ①

b)

$$\begin{bmatrix} -1 & 3 & -4 & | & 1 & 0 & 0 \\ 2 & 4 & 1 & | & 0 & 1 & 0 \\ -4 & 2 & -9 & | & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} -1 & 3 & -4 & | & 1 & 0 & 0 \\ 0 & 10 & -7 & | & 2 & 1 & 0 \\ 0 & -10 & 7 & | & -4 & 0 & 1 \end{bmatrix} \longrightarrow$$

ADD 2① to ②

ADD $-4$① to ③

ADD ② to ③

$$\longrightarrow \begin{bmatrix} -1 & 3 & -4 & | & 1 & 0 & 0 \\ 0 & 10 & -7 & | & 2 & 1 & 0 \\ 0 & 0 & 0 & | & -2 & 1 & 1 \end{bmatrix}$$

ROW OF ZEROES

∴ NOT INVERTIBLE

c)

$$\begin{bmatrix} 1 & 0 & 1 & | & 1 & 0 & 0 \\ -1 & 1 & 1 & | & 0 & 1 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 1 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \\ -1 & 1 & 1 & | & 0 & 1 & 0 \end{bmatrix}$$

INTERCHANGE ② and ③

$$\longrightarrow \begin{bmatrix} 1 & 0 & 1 & | & 1 & 0 & 0 \\ 0 & 1 & 0 & | & 0 & 0 & 1 \\ 0 & 0 & 2 & | & 1 & 1 & -1 \end{bmatrix} \longrightarrow \begin{bmatrix} 1 & 0 & 0 & | & \frac{1}{2} & -\frac{1}{2} & \frac{1}{2} \\ 0 & 1 & 0 & | & 0 & 0 & 1 \\ 0 & 0 & 1 & | & \frac{1}{2} & \frac{1}{2} & -\frac{1}{2} \end{bmatrix}$$

ADD ① to ③

ADD $-$② to ③

MULT ③ by $\frac{1}{2}$

ADD $\frac{1}{2}$③ to ①