$$\mathrm{A}=\begin{bmatrix} a_{11} & a_{12}\dots & a_{1n} \\ a_{21} & a_{22}\dots & a_{2n} \\ \dots\dots & \dots & \dots \\ a_{n1} & a_{n2}\dots & a_{nn} \end{bmatrix} \longrightarrow \mathrm{A}^{-1}=\frac{1}{\Delta A}\begin{bmatrix} C_{11} & C_{12}\dots & C_{1n} \\ C_{21} & C_{22}\dots & C_{2n} \\ \dots\dots & \dots & \dots \\ C_{n1} & C_{n2}\dots & C_{nn} \end{bmatrix}^T = \frac{1}{\Delta A}\begin{bmatrix} +M_{11} & -M_{12} & \dots & +M_{1n} \\ -M_{21} & +M_{22} & \dots & -M_{2n} \\ \dots & \dots & \dots & \dots \\ (-1)^{n+1}M_{n1} & (-1)^{n+1}M_{n2}\dots & & (-1)^{2n}M_{nn} \end{bmatrix}^T$$

$$A=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 8 \end{bmatrix}$$

$$S_{11}=\begin{bmatrix} 5 & 6 \\ 8 & 8 \end{bmatrix}, \quad S_{12}=\begin{bmatrix} 4 & 6 \\ 7 & 8 \end{bmatrix}, \quad S_{13}=\begin{bmatrix} 4 & 5 \\ 7 & 8 \end{bmatrix},$$

$$S_{21}=\begin{bmatrix} 2 & 3 \\ 8 & 8 \end{bmatrix}, \quad S_{22}=\begin{bmatrix} 1 & 3 \\ 7 & 8 \end{bmatrix}, \quad S_{23}=\begin{bmatrix} 1 & 2 \\ 7 & 8 \end{bmatrix},$$

$$S_{31}=\begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}, \quad S_{32}=\begin{bmatrix} 1 & 3 \\ 4 & 6 \end{bmatrix}, \quad S_{33}=\begin{bmatrix} 1 & 2 \\ 4 & 5 \end{bmatrix},$$

$M_{11}=\Delta S_{11}=-8,\quad M_{12}=\Delta S_{12}=-10,\quad M_{13}=\Delta S_{13}=-3,$,

$M_{21}=\Delta S_{21}=-8,\quad M_{22}=\Delta S_{22}=-13,\quad M_{23}=\Delta S_{23}=-6,$,

$M_{31}=\Delta S_{31}=-3,\quad M_{32}=\Delta S_{32}=-6,\quad M_{33}=\Delta S_{33}=-3,$,

$$Ac=\begin{bmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \end{bmatrix}=\begin{bmatrix} +M_{11} & -M_{12} & +M_{13} \\ -M_{21} & +M_{22} & -M_{23} \\ +M_{31} & -M_{32} & +M_{33} \end{bmatrix}=\begin{bmatrix} -8 & -(-10) & -3 \\ -(-8) & -13 & -(-6) \\ -3 & -(-6) & -3 \end{bmatrix}=\begin{bmatrix} -8 & 10 & -3 \\ 8 & -13 & 6 \\ -3 & 6 & -3 \end{bmatrix}$$

Using the first row $\Delta A=1xM_{11}-2xM_{12}+3xM_{13}$ = 1(-8) - 2(-10) + 3(-3) =-8+20-9=3

Or using the second row $\Delta A=-4xM_{21}+5xM_{22}-6xM_{23}$ = - 4(-8) + 5(-13) - 6(-6) =32-65+36=3

$$A^{-1}=\begin{bmatrix} M_{11} & -M_{12} & M_{13} \\ -M_{21} & M_{22} & -M_{23} \\ M_{31} & -M_{32} & M_{33} \end{bmatrix}^T = \frac{1}{3}\begin{bmatrix} -8 & 10 & -3 \\ 8 & -13 & 6 \\ -3 & 6 & -3 \end{bmatrix}^T = \frac{1}{3}\begin{bmatrix} -8 & 8 & -3 \\ 10 & -13 & 6 \\ -3 & 6 & -3 \end{bmatrix}=\begin{bmatrix} -8/3 & 8/3 & -3/3 \\ 10/3 & -13/3 & 6/3 \\ -3/3 & 6/3 & -3/3 \end{bmatrix}$$

$$A^{-1}=\begin{bmatrix} -2.667 & 2.667 & -1 \\ 3.33 & -4.33 & 2 \\ -1 & 2 & -1 \end{bmatrix}$$

$$A=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \longrightarrow$$

$$S_{11}=\begin{bmatrix} 5 & 6 \\ 8 & 9 \end{bmatrix}, \quad S_{12}=\begin{bmatrix} 4 & 6 \\ 7 & 9 \end{bmatrix}, \quad S_{13}=\begin{bmatrix} 4 & 5 \\ 7 & 8 \end{bmatrix},$$

$$S_{21}=\begin{bmatrix} 2 & 3 \\ 8 & 9 \end{bmatrix}, \quad S_{22}=\begin{bmatrix} 1 & 3 \\ 7 & 9 \end{bmatrix}, \quad S_{23}=\begin{bmatrix} 1 & 2 \\ 7 & 8 \end{bmatrix},$$

$$S_{31}=\begin{bmatrix} 2 & 3 \\ 5 & 6 \end{bmatrix}, \quad S_{32}=\begin{bmatrix} 1 & 3 \\ 4 & 6 \end{bmatrix}, \quad S_{33}=\begin{bmatrix} 1 & 2 \\ 4 & 5 \end{bmatrix}$$

$M_{11}=\Delta S_{11}=-3,\quad M_{12}=\Delta S_{12}=-6,\quad M_{13}=\Delta S_{13}=-3,$,

Using the first row $\Delta A=1xM_{11}-2xM_{12}+3xM_{13}$ = 1(-3) - 2(-6) + 3(-3) =-3+12-9=0

Since ΔA=0 A^{-1} does not exist.