Step-1

i) Given matrix

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

Given

$$C_{ij} = (-1)^{i+j} \det M_{ij}$$

Then $C_A = \begin{bmatrix} 6 & -3 \\ -1 & 2 \end{bmatrix}$ and $C_A^T = \begin{bmatrix} 6 & -1 \\ -3 & 2 \end{bmatrix}$

Step-2

Now

$$\begin{aligned} A.C_A^T &= \begin{bmatrix} 2 & 1 \\ 3 & 6 \end{bmatrix}\begin{bmatrix} 6 & -1 \\ -3 & 2 \end{bmatrix} \\ &= \begin{bmatrix} 2(6)+1(-3) & 2(-1)+1(2) \\ 3(6)+6(-3) & 3(-1)+6(2) \end{bmatrix} \\ &= \begin{bmatrix} 12-3 & -2+2 \\ 18-18 & -3+12 \end{bmatrix} \\ &= \begin{bmatrix} 9 & 0 \\ 0 & 9 \end{bmatrix} \end{aligned}$$

Note that

$$\begin{aligned} \det A &= 12-3 \\ &= 9 \end{aligned}$$

Step-3

So, we get

$$A.C_A^T = \det A \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= \det A \cdot I$$

Step-4

ii) $B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 0 & 0 \end{bmatrix}$

Then

$$C_B = \begin{bmatrix} 0 & 42 & -35 \\ 0 & -21 & 14 \\ -3 & 6 & -3 \end{bmatrix}$$

$$C_B^T = \begin{bmatrix} 0 & 0 & -3 \\ 42 & -21 & 6 \\ -35 & 14 & -3 \end{bmatrix}$$

Step-5

Now

$$B.C_B^T = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 & -3 \\ 42 & -21 & 6 \\ -35 & 14 & -3 \end{bmatrix}$$

$$= \begin{bmatrix} 84-105 & -42+42 & -3+12-9 \\ 210-210 & -105+84 & -12+30-18 \\ 0 & 0 & -21 \end{bmatrix}$$

Step-6

And

$$= \begin{bmatrix} -21 & 0 & 0 \\ 0 & -21 & 0 \\ 0 & 0 & -21 \end{bmatrix}$$

$$= -21 \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= -21I$$

And note that $\det B = \boxed{-21}$