Step-1

Thus, we have

$$\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} \begin{matrix} 1 & 2 \\ 4 & 5 \\ 7 & 8 \end{matrix}$$

The elements along the diagonal are $(1,5,9)$, $(2,6,7)$, and $(3,4,8)$. The elements along the anti diagonal are $(2,4,9)$, $(1,6,8)$, and $(3,5,7)$.

Therefore, $\det(A) = (1\times5\times9+2\times6\times7+3\times4\times8)-(2\times4\times9+1\times6\times8+3\times5\times7)$.

Step-2

Consider the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$.

Observe that 2Ã—Row 2 â€“ Row 3 = Row 1.

Therefore, the rows of the above matrix are not linearly independent. Therefore, this matrix is not invertible.

Step-3

Also, note the following:

$$\begin{aligned} \det(A) &= (1\times5\times9+2\times6\times7+3\times4\times8)-(2\times4\times9+1\times6\times8+3\times5\times7) \\ &= (45+84+96)-(72+48+105) \\ &= 225-225 \\ &= \boxed{0} \end{aligned}$$

This also tells us that the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ is not invertible.