

Inverse.

$$\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -5 \\ -1 & 3 \end{bmatrix} \cdot \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 2a-5c & 2b-5d \\ -1a+3c & -b+3d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{array}{l} 2a-5c = 1 \\ -a+3c = 0 \end{array} \quad \begin{array}{l} 2b-5d = 0 \\ -b+3d = 1 \end{array}$$

$$\begin{array}{l} 2a-5c = 1 \\ + \quad -2a+6c = 0 \\ \hline c = 1 \end{array} \quad \begin{array}{l} 2b-5d = 0 \\ -2b+6d = 2 \\ \hline d = 2 \end{array}$$

$$\begin{array}{l} -a+3(1) = 0 \\ -a+3 = 0 \\ \hline 3 = a \end{array}$$

$$\begin{array}{l} -b+3(2) = 1 \\ -b+6 = 1 \\ \hline -b = -5 \\ \hline b = 5 \end{array}$$

$$\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -5 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 2(3)+(-5)(1) & 2(5)+(-5)(2) \\ -1(3)+3(1) & -1(5)+3(2) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 2 & -5 \\ -1 & 3 \end{bmatrix} \quad \begin{array}{l} 2(3) - (-5)(-1) \\ 6 - 5 \\ 1 \end{array}$$

Determinant

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \quad ad - bc$$

Determinant is 0  
No Inverse

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$A^{-1} = \frac{1}{\det} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} \quad \text{Inverse}$$

$$\begin{bmatrix} 2 & -5 \\ -1 & 3 \end{bmatrix} \quad \begin{array}{l} \textcircled{1} \text{ Find determinant} \\ 2(3) - (-5)(-1) \\ 6 - 5 \\ 1 \end{array}$$

$$\textcircled{2} \text{ Substitute } \frac{1}{1} \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$$

$$\textcircled{3} \text{ Simplify } \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$$

Inverse

$$A = \begin{bmatrix} 2 & 2 \\ 3 & 4 \end{bmatrix}$$

determinant  $2(4) - 3(2)$   
 $8 - 6$   
 $2$

$$A^{-1} = \frac{1}{2} \begin{bmatrix} 4 & -2 \\ -3 & 2 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 2 & -1 \\ -\frac{3}{2} & 1 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 6 \\ 2 & 4 \end{bmatrix}$$

$$\det = 0 - 6(2) = 12 - 12 = 0$$

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

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