

KEY

$$\textcircled{2} \begin{bmatrix} 2 & 1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} 1 & -1 \\ 1 & 2 \end{bmatrix}$$

$$2(1) + 1(1) = 3$$

$$2(-1) + 1(2) = 1$$

$$-1(1) + 1(1) = 0$$

$$-1(-1) + 1(2) = 3$$

$$\begin{bmatrix} 3 & 1 \\ 0 & 3 \end{bmatrix} \textcircled{\text{No}}$$

$$\textcircled{4} \begin{bmatrix} 1 & 4 & -2 \\ 3 & 0 & 5 \\ 3 & 1 & 4 \end{bmatrix} \begin{bmatrix} -5 & -18 & 20 \\ 3 & 10 & -11 \\ 3 & 11 & -12 \end{bmatrix}$$

$$1(-5) + 4(3) + (-2)(3) = -5 + 12 - 6 = \textcircled{1}$$

$$1(-18) + 4(10) + (-2)(11) = -18 + 40 - 22 = \textcircled{0}$$

$$1(20) + 4(-11) + (-2)(-12) = 20 - 44 + 24 = \textcircled{0}$$

$$3(-5) + 0(3) + 5(3) = -15 + 15 = \textcircled{0}$$

$$3(-18) + 0(10) + 5(11) = -54 + 55 = \textcircled{1}$$

$$3(20) + 0(-11) + 5(-12) = 60 - 60 = \textcircled{0}$$

$$3(-5) + 1(3) + 4(3) = -15 + 3 + 12 = \textcircled{0}$$

$$3(-18) + 1(10) + 4(11) = -54 + 10 + 44 = \textcircled{0}$$

$$3(20) + 1(-11) + 4(-12) = 60 - 11 - 48 = \textcircled{1}$$

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

Yes

$$\textcircled{6} \quad \begin{bmatrix} 4 & 5 \\ 7 & 9 \end{bmatrix} \quad D = 36 - 35 = \textcircled{1}$$

$$\frac{1}{1} \begin{bmatrix} 9 & -5 \\ -7 & 4 \end{bmatrix} = \begin{bmatrix} 9 & -5 \\ -7 & 4 \end{bmatrix}$$

$$\textcircled{8} \quad \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix} \quad D = 2 - 0 = \textcircled{2}$$

$$\frac{1}{2} \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & \frac{1}{2} \end{bmatrix}$$

$$\textcircled{10} \quad \begin{bmatrix} 3 & -4 \\ 6 & -8 \end{bmatrix} \quad D = -24 + 24 = 0$$

The Matrix does not have an inverse,

$$\textcircled{12} \quad \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} \quad D = 3 - 8 = \textcircled{-5}$$

$$-\frac{1}{5} \begin{bmatrix} 1 & -2 \\ -4 & 3 \end{bmatrix} = \begin{bmatrix} -\frac{1}{5} & \frac{2}{5} \\ \frac{4}{5} & -\frac{3}{5} \end{bmatrix}$$

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

$$D = 12 - 12 = 0$$

The Matrix does not have an inverse.

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$$\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix} x = \begin{bmatrix} 4 & -1 \\ 5 & 2 \end{bmatrix}$$

$$D = 3 - 4 = -1$$

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

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

$$x = \begin{bmatrix} -3 & 2 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} 4 & -1 \\ 5 & 2 \end{bmatrix}$$

$$-3(4) + 2(5) = -2$$

$$-3(-1) + 2(2) = 7$$

$$2(4) - 1(5) = 3$$

$$2(-1) - 1(2) = -4$$

$$\begin{bmatrix} -2 & 7 \\ 3 & -4 \end{bmatrix}$$

$$\textcircled{17} \begin{bmatrix} 12 & 17 \\ 5 & 3 \end{bmatrix} x = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$$

$$D = 36 - 35 = \textcircled{1}$$

$$A^{-1} = \frac{1}{1} \begin{bmatrix} 3 & -7 \\ -5 & 12 \end{bmatrix}$$

$$\begin{bmatrix} 3 & -7 \\ -5 & 12 \end{bmatrix} \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$$

$$3(2) + (-7)(3) = -15$$

$$3(-1) + (-7)(2) = -17$$

$$-5(2) + 12(3) = 26$$

$$-5(-1) + 12(2) = 29$$

$$\begin{bmatrix} -15 & -17 \\ 26 & 29 \end{bmatrix}$$

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$$\begin{bmatrix} 6 & 2 \\ 4 & -2 \end{bmatrix} x - \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 8 & 2 \\ 6 & -4 \end{bmatrix}$$
$$+ \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix} \quad \begin{bmatrix} 2 & -2 \\ 3 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 2 \\ 4 & -2 \end{bmatrix} x = \begin{bmatrix} 10 & 0 \\ 9 & -3 \end{bmatrix}$$

$$D = -12 - 8 = -20$$

$$\frac{1}{-20} \begin{bmatrix} -2 & -2 \\ -4 & 6 \end{bmatrix} = \begin{bmatrix} \frac{1}{10} & \frac{1}{10} \\ \frac{1}{5} & -\frac{3}{10} \end{bmatrix}$$

$$\begin{bmatrix} \frac{1}{10} & \frac{1}{10} \\ \frac{1}{5} & -\frac{3}{10} \end{bmatrix} \begin{bmatrix} 10 & 0 \\ 9 & -3 \end{bmatrix}$$

$$\frac{1}{10} (10) + \frac{1}{10} (9) =$$

$$\frac{1}{10} (0) + \frac{1}{10} (-3)$$

$$\frac{1}{5} (10) + \frac{-3}{10} (9)$$

$$\frac{1}{5} (0) + \frac{-3}{10} (3)$$

$$x = \begin{bmatrix} \frac{19}{10} & -\frac{3}{10} \\ \frac{7}{10} & \frac{9}{10} \end{bmatrix}$$