Determinants: $|A|$

(only matrix w/ a det is a square matrix)

$$A = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} = a_1b_2 - a_2b_1$$

$$\begin{vmatrix} 7 & -3 \\ -4 & -8 \end{vmatrix} = 7(-8) - (-3)(-4)$$
$$= -56 - 12 = -68$$

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$$\begin{vmatrix} -4 & -5 \\ -2 & -6 \end{vmatrix} = -4(-6) - (-5)(-2)$$
$$= 24 - 10 = 14$$

$$\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$$

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Inverses:

$2(1) = 2$

$-7(1) = -7$

"Identity" $= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ or $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$AI = A$

$BI = B$

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inverse

$2\left(\frac{1}{2}\right) = 1$

$5\left(\frac{1}{5}\right) = 1$

$A \cdot A^{-1} = I$

$B \cdot B^{-1} = I$

Oct 13-11:59 AM

1. Are the following matrices inverses?

$$A = \begin{bmatrix} 5 & -3 \\ -7 & 4 \end{bmatrix} \quad B = \begin{bmatrix} -4 & 3 \\ -7 & 5 \end{bmatrix}$$

$$\begin{bmatrix} 5 & -3 \\ -7 & 4 \end{bmatrix} = \begin{bmatrix} 5(-4)+-3(-7) & 5(3)+-3(5) \\ -7(-4)+4(-7) & -7(3)+4(5) \end{bmatrix}$$
$$= \begin{bmatrix} 20+21 & 15+-15 \\ 28+-28 & -21+20 \end{bmatrix}$$

NO $= \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

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② $A \cdot B = I$?

$$\begin{bmatrix} 3 & 1 & 0 \\ 1 & -1 & 2 \\ 1 & 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 3/8 & 1/8 & -2/8 \\ -1/8 & -3/8 & 6/8 \\ -2/8 & 2/8 & 4/8 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{9}{8} + \frac{-1}{8} + 0 & \frac{3}{8} + \frac{-3}{8} & \frac{-6}{8} + \frac{6}{8} \\ \text{YES} & & \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$

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II Inverses

$2(1) = 2$

$10(1) = 10$

Identity $= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ or $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$AI = A$

$BI = B$

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inverse

$2\left(\frac{1}{2}\right) = 1$

$5\left(\frac{1}{5}\right) = 1$

$\sin x \csc x = 1$

$A \cdot A^{-1} = I$

$B \cdot B^{-1} = I$

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Are the following matrices inverses?

① $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}_A \cdot \begin{bmatrix} -2 & 1 \\ 3/2 & -1/2 \end{bmatrix}_B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $\begin{matrix} 1 \\ -6+6 \end{matrix}$ $\begin{matrix} 1+-1 \\ 3(1)+-3 \end{matrix}$ yes

$-2+3$

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② $\begin{bmatrix} 3 & 4 \\ 2 & 6 \end{bmatrix}_A \cdot \begin{bmatrix} 3/5 & -2/5 \\ -1/5 & -3/10 \end{bmatrix}_B = I$

$\begin{bmatrix} 3 & 4 \\ 2 & 6 \end{bmatrix}$ $\begin{matrix} \frac{3}{5}+\frac{4}{5} \\ \frac{2}{5}+\frac{6}{5} \end{matrix}$ $\begin{matrix} -\frac{6}{5}+\frac{12}{10} \\ -\frac{4}{5}+\frac{6}{5} \end{matrix}$ $= \begin{bmatrix} 1 & -\frac{12}{5} \\ 1 & \end{bmatrix}$

NO

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Find the inverse:

change the signs

① find the det

switch

② $\frac{1}{\text{det}}$

③ $\frac{1}{\text{det}} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix} = A^{-1}$

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$A = \begin{bmatrix} 3 & 2 \\ 5 & 3 \end{bmatrix}$

det: $9 - 10 = -1$

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

✓ $A \cdot A^{-1} = I$

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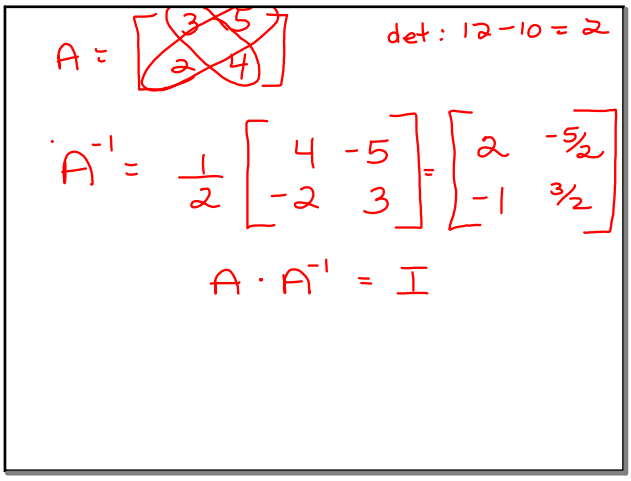
A =
3
5
2
4
det: 12 − 10 = 2
$A^{-1} = \frac{1}{2}\begin{bmatrix} 4 & -5 \\ -2 & 3 \end{bmatrix} = \begin{bmatrix} 2 & -5/2 \\ -1 & 3/2 \end{bmatrix}$
$A \cdot A^{-1} = I$

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