GO COUGARS!

p 556 **Homework Questions**

In Exercises 1–12, find the determinant of the matrix.

1. $[4]$

2. $[-10]$

3. $\begin{bmatrix} 8 & 4 \\ 2 & 3 \end{bmatrix}$

4. $\begin{bmatrix} -9 & 0 \\ 6 & 2 \end{bmatrix}$

5. $\begin{bmatrix} 6 & 2 \\ -5 & 3 \end{bmatrix}$

6. $\begin{bmatrix} 3 & -3 \\ 4 & -8 \end{bmatrix}$

7. $\begin{bmatrix} -7 & 6 \\ \frac{1}{2} & 3 \end{bmatrix}$

8. $\begin{bmatrix} 4 & -3 \\ 0 & 0 \end{bmatrix}$

In Exercises 37–40, find (a) $|A|$, (b) $|B|$, (c) AB, and (d) $|AB|$.

37. $A = \begin{bmatrix} -1 & 0 \\ 0 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 0 \\ 0 & -1 \end{bmatrix}$

38. $A = \begin{bmatrix} 4 & 0 \\ 3 & -2 \end{bmatrix}, \quad B = \begin{bmatrix} -1 & 1 \\ -2 & 2 \end{bmatrix}$

In Exercises 49–60, solve for x.

51. $\begin{vmatrix} 2x & -3 \\ -2 & 2x \end{vmatrix} = 3$

53. $\begin{vmatrix} x & 1 \\ 2 & x-2 \end{vmatrix} = -1$

55. $\begin{vmatrix} x+3 & 2 \\ 1 & x+2 \end{vmatrix} = 0$

Feb 2-9:51 PM

7.6 The Determinant and Inverse of a 2 x 2 Matrix

May 3-10:28 AM

To solve $\frac{ax}{a} = \frac{b}{a}$

We can multiply by a^{-1} = $\frac{1}{a}$

$\frac{1}{a}ax = b\left(\frac{1}{a}\right)$

To solve a matrix we use the same process

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

May 3-10:30 AM

Ex1 find AB and BA $A = \begin{bmatrix} 2 & -1 \\ -3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} -1 & -1 \\ -3 & -2 \end{bmatrix}$

$AB = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ identity matrix ⇒ A & B are inverses of each other

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

AB = BA

because A & B are inverses!

May 3-10:32 AM

Finding an inverse matrix:

Ex2 Find the inverse of $A = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$

A^{-1}

We know that [A][A^{-1}]=[I]

$$\begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

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

$a - 2c = 1$ $\quad$ $b - 2d = 0$

$-a + 3c = 0$ $\quad$ $-b + 3d = 1$

$c = 1$ $\quad$ $d = 1$

$a = 3$ $\quad$ $b = 2$

$A^{-1} = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$ $\quad$ $AA^{-1} = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix} \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

May 11-9:36 AM

There is an easier way to find an inverse matrix! (Thank goodness!)

But first we need to talk about the determinant of a matrix.

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then det [A] = $ad - bc$

Ex3 Find the determinant of $A = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$

$|A| = 1$

May 11-9:42 AM

Now, to find an inverse matrix use:

$$\frac{1}{ad-bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

Ex4 Find the inverse of the matrix

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

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

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

May 11-9:48 AM

Ex5 Find the inverse of $A=\begin{bmatrix} 3 & 6 \\ 0 & 2 \end{bmatrix}$

Check your answer.

$|A| = 3\cdot2 - 6\cdot0$
$= 6$

$A^{-1} = \frac{1}{6}\begin{bmatrix} 2 & -6 \\ 0 & 3 \end{bmatrix}$

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

$A^{-1}A = \begin{bmatrix} \frac{1}{3} & -1 \\ 0 & \frac{1}{2} \end{bmatrix}\begin{bmatrix} 3 & 6 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

May 15-5:51 AM

What if the determinant is zero?

A singular matrix is one whose determinant is zero. If the determinant is zero the matrix does not have an inverse or is invertible.

May 15-5:55 AM

Find the determinant

Ex6 $A = \begin{bmatrix} 3 & 6 \\ 1 & 2 \end{bmatrix}$

Ex7 $A = \begin{bmatrix} 2 & -4 \\ -2 & 4 \end{bmatrix}$

What do you notice?

May 15-6:30 AM

HOMEWORK

p 547 3, 5, 11-15 odd, 29, 33-39 odd, 49, 53

Worksheet 1-10

$AX = B$

$\cancel{A^{-1}A}X = A^{-1}B$

$XA = B$

$X\cancel{AA^{-1}} = BA^{-1}$