Review of Matrices Name: _____

Determine whether each pair of matrices are inverses * their product should be identity matrix

1. $M = \begin{bmatrix} 5 & 8 \\ 4 & 6 \end{bmatrix}, N = \begin{bmatrix} -3 & 4 \\ 2 & \frac{-5}{2} \end{bmatrix}$

$\begin{bmatrix} 15+16 & 20-20 \\ -12+12 & 16-15 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Yes, inverses

2. $L = \begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix}, K = \begin{bmatrix} \frac{7}{2} & -\frac{3}{2} \\ 1 & -2 \end{bmatrix}$

$\begin{bmatrix} 10.5+7 & \_\_\_ \\ \_\_\_ & \_\_\_ \end{bmatrix} = \begin{bmatrix} 17.5 & \\ & \end{bmatrix}$

No, not inverses

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

Find the inverse of each matrix, if it exists.

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

$\frac{1}{6--5} = \frac{1}{11}\begin{bmatrix} 3 & -5 \\ 1 & 2 \end{bmatrix}$

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

$\frac{1}{2--15} = \frac{1}{17}\begin{bmatrix} 1 & 5 \\ -3 & 2 \end{bmatrix}$

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

$\frac{1}{-36-36} = \frac{1}{0}\begin{bmatrix} & \\ & \end{bmatrix}$

No inverse exists

Solve each system of equations by using inverse matrices.

6. $\begin{bmatrix} 2 & 4 \\ 3 & -1 \end{bmatrix} \cdot \begin{bmatrix} c \\ d \end{bmatrix} = \begin{bmatrix} -2 \\ 18 \end{bmatrix}$ A^{-1} $\frac{1}{-2-12} = \frac{1}{-14}$

$\begin{bmatrix} c \\ d \end{bmatrix} = \frac{1}{-14}\begin{bmatrix} -1 & -4 \\ -3 & 2 \end{bmatrix}\begin{bmatrix} -2 \\ 18 \end{bmatrix}$

$\begin{bmatrix} c \\ d \end{bmatrix} = \frac{1}{-14}\begin{bmatrix} -70 \\ 42 \end{bmatrix}$

$\begin{bmatrix} c \\ d \end{bmatrix} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$ (5, -3)

7. $\begin{bmatrix} 3 & 6 \\ 5 & 9 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -15 \\ 6 \end{bmatrix}$ A^{-1} $\frac{1}{27-30} = \frac{1}{-3}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{-1}{3}\begin{bmatrix} 9 & -6 \\ -5 & 3 \end{bmatrix} \cdot \begin{bmatrix} -15 \\ 6 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{-1}{3}\begin{bmatrix} -171 \\ 93 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 57 \\ -31 \end{bmatrix}$ (57, -31)

8. $2x + 3y = 5$
$3x - 2y = 1$ A^{-1} $\frac{1}{-4-9} = \frac{1}{-13}$

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

$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-13}\begin{bmatrix} -2 & -3 \\ -3 & 2 \end{bmatrix} \cdot \begin{bmatrix} 5 \\ 1 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \frac{1}{-13}\begin{bmatrix} -13 \\ -13 \end{bmatrix}$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ (1, 1)

9. $8d + 9f = 13$
$-6d + 5f = -45$ A^{-1} $\frac{1}{40--54} = \frac{1}{94}$

$\begin{bmatrix} 8 & 9 \\ -6 & 5 \end{bmatrix} \cdot \begin{bmatrix} d \\ f \end{bmatrix} = \begin{bmatrix} 13 \\ -45 \end{bmatrix}$

$\begin{bmatrix} d \\ f \end{bmatrix} = \frac{1}{94}\begin{bmatrix} 5 & -9 \\ 6 & 8 \end{bmatrix}\begin{bmatrix} 13 \\ -45 \end{bmatrix}$

$\begin{bmatrix} d \\ f \end{bmatrix} = \frac{1}{94}\begin{bmatrix} 470 \\ -282 \end{bmatrix}$

$\begin{bmatrix} d \\ f \end{bmatrix} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$ (5, -3)

Given the system of equation: $3x - 2y = 9$, $x + 2y = -5$

Write the system as a matrix equation

$$\begin{bmatrix} 3 & -2 \\ 1 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ -5 \end{bmatrix}$$

Using you graphing calculator, solve the system of equation: $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 & -2 \\ 1 & 2 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 9 \\ -5 \end{bmatrix}$

$A^{-1} \cdot B$

$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ -3 \end{bmatrix}$ $(1, -3)$

Solve each system of equations by using the calculator.

1) $\begin{bmatrix} 2 & -1 \\ 3 & 5 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -12 \\ 34 \end{bmatrix}$

$(-2, 8)$

2) $\begin{bmatrix} 3 & -2 \\ -1 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -5 \\ 18 \end{bmatrix}$

$(3, 7)$

3) $\begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 8 \end{bmatrix}$

$(-4, 8)$

4) $\begin{bmatrix} 6 & -3 \\ -2 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 12 \\ -4 \end{bmatrix}$

Error in calc.

No inverse

* cannot tell if system has $\emptyset$ or infinitely many

Write each system of equations as a matrix and solve using your graphing calculator.

1) $3x + 3y = 15$
$-2x + 3y = -5$

$\begin{bmatrix} 3 & 3 \\ -2 & 3 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 15 \\ -5 \end{bmatrix}$

$(4, 1)$

2) $-3y = -2x + 9$ $2x - 3y = 9$
$5x + 6y = 4$

$\begin{bmatrix} 2 & -3 \\ 5 & 6 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 9 \\ 4 \end{bmatrix}$

$\left(\frac{22}{9}, \frac{-37}{27}\right)$ * leave improper

3) $2x + y - z = -8$
$4x - y + 2z = -3$
$-3x + y + 2z = 5$

$\begin{bmatrix} 2 & 1 & -1 \\ 4 & -1 & 2 \\ -3 & 1 & 2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -8 \\ -3 \\ 5 \end{bmatrix}$

$(-2, -3, 1)$

4) $-5y - 5z = 2 + x$ $-x - 5y - 5z = 2$
$4x = 5y - 4z + 19$ $4x - 5y + 4z = 19$
$x + 5y - z = -20$ $x + 5y - z = -20$

$\begin{bmatrix} -1 & -5 & -5 \\ 4 & -5 & 4 \\ 1 & 5 & -1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 19 \\ -20 \end{bmatrix}$

$(-2, -3, 3)$