4-4

NAME ______________________ DATE ____________

Reteaching Worksheet

Identity and Inverse Matrices

Apply the following definitions for identities and inverses of matrices.

Identity Matrix for Multiplication	
Definition	**Example**
The identity matrix, I, for multiplication is a square matrix with a 1 for every element of the principal diagonal and a 0 for all other positions. The principal diagonal extends from upper left to lower right.	For 2 × 2 matrices, $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is the identity matrix because $\begin{bmatrix} a & b \\ c & d \end{bmatrix}\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$.

Inverse of a 2 × 2 Matrix	
Definition	**Example**
If $M = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then there is an inverse matrix, M^{-1}, if and only if $\begin{vmatrix} a & b \\ c & d \end{vmatrix} \neq 0$. Then $M^{-1} = \frac{1}{ad - bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$.	Find the inverse of $A = \begin{bmatrix} 4 & 3 \\ -2 & 8 \end{bmatrix}$, if it exists. **1.** Compute the value of the determinant to make sure that the inverse exists. $\begin{vmatrix} 4 & 3 \\ -2 & 8 \end{vmatrix} = 32 - (-6) = 38$ **2.** Since the determinant does not equal 0, A^{-1} exists and $A^{-1} = \frac{1}{38}\begin{bmatrix} 8 & -3 \\ 2 & 4 \end{bmatrix}$.

Find the inverse of each matrix, if it exists.

1. $\begin{bmatrix} 24 & 12 \\ 8 & 4 \end{bmatrix}$

2. $\begin{bmatrix} 26 & -8 \\ 4 & -9 \end{bmatrix}$

3. $\begin{bmatrix} 40 & -10 \\ -20 & 30 \end{bmatrix}$

4. $\begin{bmatrix} -5 & -4 \\ 0 & 3 \end{bmatrix}$

5. $\begin{bmatrix} 18 & 9 \\ 3 & 6 \end{bmatrix}$

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

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

8. $\begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix}$

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