NAME Key DATE______ PERIOD ______

3-8A Skills Practice
Inverse Matrices

Determine whether the matrices in each pair are inverses.

1. $X = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, $Y = \begin{bmatrix} -1 & 0 \\ 1 & 1 \end{bmatrix}$

$X \cdot Y$

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

3. $M = \begin{bmatrix} -1 & 0 \\ 0 & 3 \end{bmatrix}$, $N = \begin{bmatrix} -1 & 0 \\ 0 & -3 \end{bmatrix}$

$M \cdot N$

$$\begin{bmatrix} -1 & 0 \\ 0 & 3 \end{bmatrix} \cdot \begin{bmatrix} -1 & 0 \\ 0 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & -9 \end{bmatrix}$$ No

5. $V = \begin{bmatrix} 0 & 7 \\ -7 & 0 \end{bmatrix}$, $W = \begin{bmatrix} 0 & -\frac{1}{7} \\ \frac{1}{7} & 0 \end{bmatrix}$

$V \cdot W$

$$\begin{bmatrix} 0 & 7 \\ -7 & 0 \end{bmatrix} \cdot \begin{bmatrix} 0 & -\frac{1}{7} \\ \frac{1}{7} & 0 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$W \cdot V$

$$\begin{bmatrix} 0 & -\frac{1}{7} \\ \frac{1}{7} & 0 \end{bmatrix} \cdot \begin{bmatrix} 0 & 7 \\ -7 & 0 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

yes

7. $G = \begin{bmatrix} 4 & -3 \\ 1 & 2 \end{bmatrix}$, $H = \begin{bmatrix} \frac{2}{11} & \frac{3}{11} \\ -\frac{1}{11} & \frac{4}{11} \end{bmatrix}$

$G \cdot H$

$$\begin{bmatrix} 4 & -3 \\ 1 & 2 \end{bmatrix} \cdot \begin{bmatrix} \frac{2}{11} & \frac{3}{11} \\ -\frac{1}{11} & \frac{4}{11} \end{bmatrix} = \begin{bmatrix} \frac{8}{11} + \frac{3}{11} & \frac{12}{11} - \frac{12}{11} \\ 0 & \frac{3}{11} + \frac{8}{11} \end{bmatrix}$$

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

3-8A Skill Practice (p. 2) Inverse of A

Find the inverse of each matrix, if it exists.

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

9. $\begin{bmatrix} 0 & 2 \\ 4 & 0 \end{bmatrix} = A$ $\det A = 0 - 8 = -8$

$$A^{-1} = \frac{1}{-8}\begin{bmatrix} 0 & -2 \\ -4 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & \frac{1}{4} \\ \frac{1}{2} & 0 \end{bmatrix} \leftarrow \text{Inverse of } A$$

11. $\begin{bmatrix} 9 & 3 \\ 6 & 2 \end{bmatrix} = A$ $\det A = 18 - 18 = 0$

So, A is a singular matrix & an inverse for A doesn't exist.

13. $\begin{bmatrix} 1 & -1 \\ 3 & 3 \end{bmatrix} = A$ $\det A = 3 - -3 = 6$

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