Name

# 5-5B Lesson Master

**Questions on SPUR Objectives**
See Student Edition pages 367–371 for objectives.

## SKILLS Objective B

**In 1–6, a matrix is given. a. Find its determinant. b. Find its inverse, if it exists.**

1. $\begin{bmatrix} 7 & -8 \\ 3 & 4 \end{bmatrix}$

a. _____

b. _____

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

a. _____

b. _____

3. $\begin{bmatrix} 14 & 2 \\ 3 & 9 \end{bmatrix}$

a. _____

b. _____

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

a. _____

b. _____

5. $\begin{bmatrix} 0.5 & 1.5 \\ 0.5 & -0.5 \end{bmatrix}$

a. _____

b. _____

6. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

a. _____

b. _____

7. Show that $\begin{bmatrix} 12 & 2 \\ 9 & 1 \end{bmatrix}$ and $\begin{bmatrix} -\frac{1}{6} & \frac{1}{3} \\ \frac{3}{2} & -2 \end{bmatrix}$ are inverses of each other.

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8. Show that $\begin{bmatrix} 5 & 4 \\ 1 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 4 \\ -1 & 5 \end{bmatrix}$ are *not* inverses of each other.

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9. Consider the matrix $\begin{bmatrix} 5 & 4 \\ c & 8 \end{bmatrix}$. For what values of $c$ does the matrix *not* have an inverse? _____

10. The matrix for $S_4$ is $\begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix}$.

a. Find the inverse of the matrix for $S_4$. _____

b. Explain the result to Part a geometrically. _____

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11. What transformation is represented by $\begin{bmatrix} 0.7 & 0 \\ 0 & 0.7 \end{bmatrix}$? _____

12. Use a calculator to find the inverse of $\begin{bmatrix} 8 & -1 & 1 \\ -4 & 3 & -3 \\ -12 & 9 & 11 \end{bmatrix}$. _____

13. Jorge and Heidi enjoy sending messages back and forth to each other in code. Heidi receives the coded message 41, 61, 45, 45, 74, 76, 27, 39, 19, 14, 78, 75. Jorge tells Heidi he used the encoding matrix $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ and that the key is [space] = 26, A = 27, B = 1, C = 2, D = 3, etc.

a. Find the decoding matrix Heidi needs. _____

b. Write the coded message as a $2 \times 6$ matrix. _____

c. Give the product of the matrices from Parts a and b. _____

d. What message did Jorge send? _____

e. Heidi encodes the message "SAME TO YOU" and sends it to Jorge. What coded message does he receive?

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