

GUIDED NOTES – 7.7 SOLVING SYSTEMS WITH INVERSES

LEARNING OBJECTIVES

In this section, you will:

- Find the inverse of a matrix.
- Solve a system of linear equations using an inverse matrix.

FINDING THE INVERSE OF A MATRIX

Study the box in your textbook section titled “the identity matrix and multiplicative inverses”.

- The identity matrix, I_n , is a square matrix containing _____ down the main diagonal and _____ everywhere else. Write the identity matrix for a 4×4 matrix, I_4 , below.

$$I_4 =$$

- If A is an $n \times n$ matrix and B is an $n \times n$ matrix such that $AB = BA =$ _____, then $B =$ _____, the multiplicative inverse of matrix A .
- Write out the 2 step process for showing a matrix is the multiplicative inverses of another matrix, given a 2 matrices.

1.

2.

Try It: Read Example 2 in the text, then answer the following.

Show that the following two matrices are inverses of each other.

$$A = \begin{bmatrix} 1 & 4 \\ -1 & -3 \end{bmatrix}, B = \begin{bmatrix} -3 & -4 \\ 1 & 1 \end{bmatrix}$$

- Write out the formula for finding the multiplicative inverse of a 2×2 matrix.

Try It: Read Example 4 in the text, then answer the following.

Use the formula to find the inverse of matrix A . Verify your answer by augmenting with the identity matrix.

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

NOTE: The student is not responsible for “Finding the Multiplicative Inverse of 3×3 Matrices”.

SOLVING A SYSTEM OF LINEAR EQUATIONS USING THE INVERSE OF A MATRIX

- Using matrix multiplication, we may define a system of equations with the same number of equations as variables as

$$AX = B, \text{ where}$$

A is the _____ matrix

X is the _____ matrix

B is the _____ matrix

- If given a system of equations such as the ones below, what should $AX = B$ look like?

$$a_1x + b_1y = c_1$$

$$a_2x + b_2y = c_2$$

Study the box in your textbook section titled “solving a system of equations using the inverse of a matrix”.

- Given a system of equations, write the coefficient matrix A , the variable matrix X , and the constant matrix B
then $AX = B$, we multiply both sides by the _____ of matrix A to obtain a solution.

Try It: Read Examples 7 and 8 in the text, then answer the following.

Solve the system using the inverse of the coefficient matrix.

$$2x - 5y = -7$$

$$3x + 4y = 24$$