Inspiring Greatness

INDEPENDENCE SCHOOL DISTRICT

Math Virtual Learning

College Algebra

May 21, 2020

College Algebra
Lesson: May 21, 2020

Objective/Learning Target:
Students will be able to find matrix inverses.

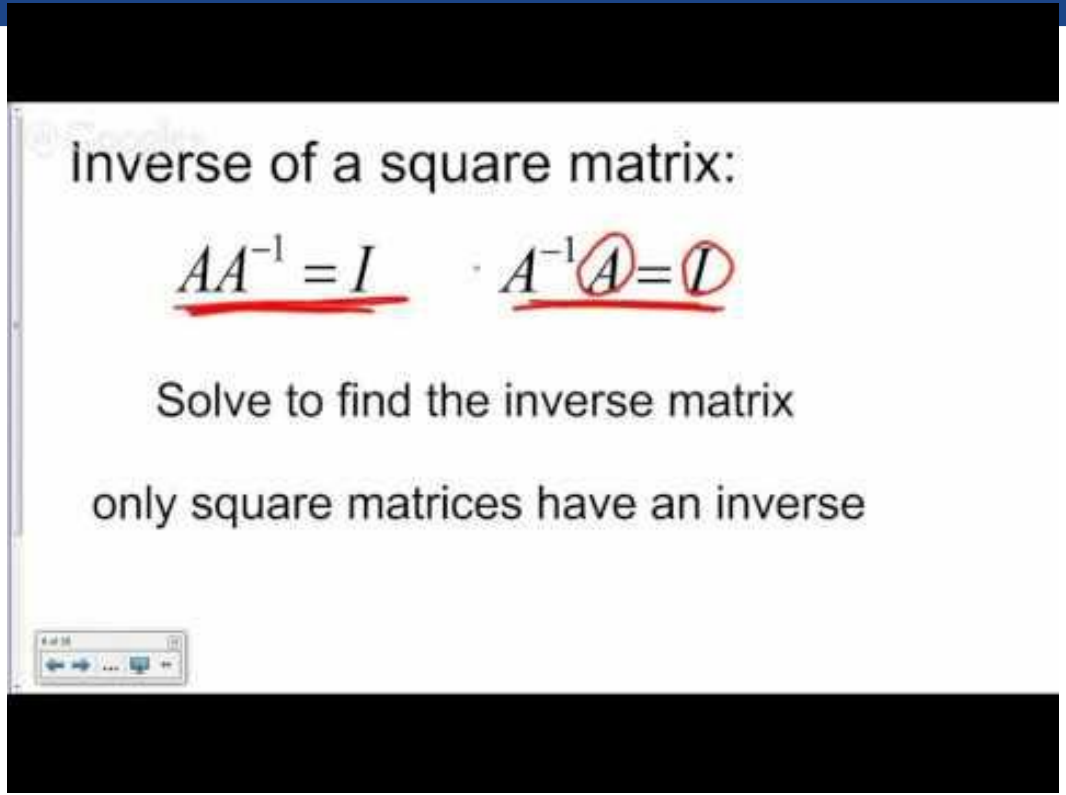
Warm Up Activity:

Watch the video on the inverse matrix

Inverse Matrix

Lesson:

Watch this video on how to find the inverse of a matrix. We encourage you to have your own sheet of paper out and work along with the video.



Practice:

Practice both 2x2 and 3x3 matrix inverses.

2x2 Inverse

3x3 Inverse

Additional Practice:

Find the inverse of the Matrix:

1) $A = \begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix}$

2) $B = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 5 & -1 \\ -2 & -1 & -2 \end{bmatrix}$

Additional Practice Answers: Solutions to Additional Problems

1)

$$A^{-1} = \begin{bmatrix} \frac{2}{5} & \frac{-1}{5} \\ \frac{-3}{5} & \frac{4}{5} \end{bmatrix}$$

2)

$$B^{-1} = \begin{bmatrix} \frac{11}{2} & \frac{-5}{2} & \frac{-3}{2} \\ -4 & 2 & 1 \\ \frac{-7}{2} & \frac{3}{2} & \frac{1}{2} \end{bmatrix}$$

Work for additional Problem 1: The Gauss-Jordan Method

Step1: Set up the given matrix with the identity matrix as the form of $\left[\begin{array}{cc|cc} 4 & 1 & 1 & 0 \\ 3 & 2 & 0 & 1 \end{array}\right]$

Step 2: Transforming the left Matrix into the identical matrix follow the *rules of Row operations*.

$$\left[\begin{array}{cc|cc} 4 & 1 & 1 & 0 \\ 3 & 2 & 0 & 1 \end{array}\right] \xrightarrow{R_1 \div 4} \left[\begin{array}{cc|cc} 1 & \frac{1}{4} & \frac{1}{4} & 0 \\ 3 & 2 & 0 & 1 \end{array}\right] \xrightarrow{-3R_1+R_2} \left[\begin{array}{cc|cc} 1 & \frac{1}{4} & \frac{1}{4} & 0 \\ 0 & \frac{5}{4} & \frac{-3}{4} & 1 \end{array}\right]$$

$$\xrightarrow{(4/5)R_2} \left[\begin{array}{cc|cc} 1 & \frac{1}{4} & \frac{1}{4} & 0 \\ 0 & 1 & \frac{-3}{5} & \frac{4}{5} \end{array}\right] \xrightarrow{(-1/4)R_2+R_1} \left[\begin{array}{cc|cc} 1 & 0 & \frac{2}{5} & \frac{-1}{5} \\ 0 & 1 & \frac{-3}{5} & \frac{4}{5} \end{array}\right] \qquad A^{-1} = \begin{bmatrix} \frac{2}{5} & \frac{-1}{5} \\ \frac{-3}{5} & \frac{4}{5} \end{bmatrix}$$

Work for additional Problem 2 Slide 2:

$$\xrightarrow{(-1)\,R_2} \left[\begin{array}{ccc|ccc} 1 & 2 & -1 & 1 & 0 & 0 \\ 0 & 1 & -2 & 3 & -1 & 0 \\ 0 & 3 & -4 & 2 & 0 & 1 \end{array}\right] \xrightarrow{(-2)\,R_2 + R_1} \left[\begin{array}{ccc|ccc} 1 & 0 & 3 & -5 & 2 & 0 \\ 0 & 1 & -2 & 3 & -1 & 0 \\ 0 & 3 & -4 & 2 & 0 & 1 \end{array}\right] \xrightarrow{(-3)\,R_2 + R_3}$$

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 3 & -5 & 2 & 0 \\ 0 & 1 & -2 & 3 & -1 & 0 \\ 0 & 0 & 2 & -7 & 3 & 1 \end{array}\right] \xrightarrow{R_3 \div 2} \left[\begin{array}{ccc|ccc} 1 & 0 & 3 & -5 & 2 & 0 \\ 0 & 1 & -2 & 3 & -1 & 0 \\ 0 & 0 & 1 & \frac{-7}{2} & \frac{3}{2} & \frac{1}{2} \end{array}\right] \xrightarrow{2R_3 + R_2} \left[\begin{array}{ccc|ccc} 1 & 0 & 3 & -5 & 2 & 0 \\ 0 & 1 & 0 & -4 & 2 & 1 \\ 0 & 0 & 1 & \frac{-7}{2} & \frac{3}{2} & \frac{1}{2} \end{array}\right]$$

$$\xrightarrow{(-3)R_3 + R_1} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & \frac{11}{2} & \frac{-5}{2} & \frac{-3}{2} \\ 0 & 1 & 0 & -4 & 2 & 1 \\ 0 & 0 & 1 & \frac{-7}{2} & \frac{3}{2} & \frac{1}{2} \end{array}\right]$$

$$B^{-1} = \left[\begin{array}{ccc} \frac{11}{2} & \frac{-5}{2} & \frac{-3}{2} \\ -4 & 2 & 1 \\ \frac{-7}{2} & \frac{3}{2} & \frac{1}{2} \end{array}\right]$$