

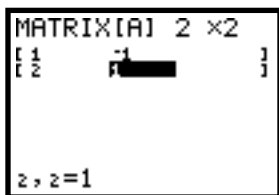
# TI-82/83 Solving Systems with Inverse Matrices

## Example

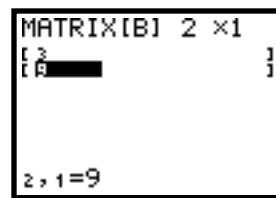
Solve the following system using matrices.

$$\begin{aligned} x - y &= 3 \\ 2x + y &= 9 \end{aligned}$$

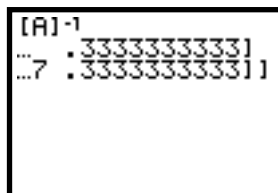
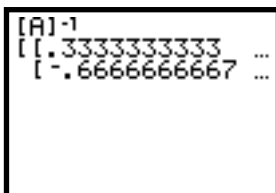
**STEP 1:** Press **MATRIX** **◀** **1** to enter the coefficient matrix. Set up a  $2 \times 2$  matrix by pressing **2** **ENTER** **2** **ENTER**. Enter the elements by pressing **1** **ENTER** **(-)** **1** **ENTER** **2** **ENTER** **1** **ENTER**.



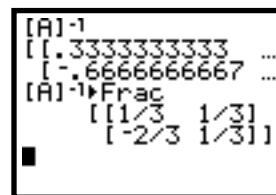
**STEP 2:** Enter the constant matrix by pressing **MATRIX** **◀** **2**. Set up a  $2 \times 1$  matrix by pressing **2** **ENTER** **1** **ENTER**. Enter the elements as you did in STEP 1.



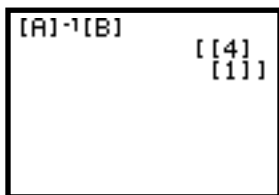
**STEP 3:** Press **2nd** [QUIT] to return to the home screen. Obtain the inverse coefficient matrix by pressing **MATRIX** **1** **x<sup>-1</sup>** **ENTER**. The ellipses indicate that the rest of the matrix lies off the screen to the right. Pressing **▶** will bring more of the matrix into view.



**STEP 4:** Press **2nd** [ENTRy] **MATH** **1** **ENTER** to see the matrix elements as fractions.



**STEP 5:** To find the solution, press **MATRIX** **1** **x<sup>-1</sup>** **MATRIX** **2** **ENTER**.



## Exercises

Enter the variable and constant matrices for each system of equations. Find the inverse variable matrix and the solution matrix.

1.  $\begin{aligned} 2x + 4y &= 4 \\ 4x + 7y &= 7 \end{aligned}$

2.  $\begin{aligned} -5x - 2y &= 4 \\ 5x - 2y &= 3 \end{aligned}$

3.  $\begin{aligned} 4x - 10y &= 6 \\ 6x + 5y &= -51 \end{aligned}$

4.  $\begin{aligned} 4x - 2y &= 5 \\ y - x &= 5 \end{aligned}$

# Answers

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1.  $\begin{bmatrix} -3.5 & 2 \\ 2 & -1 \end{bmatrix}; \begin{bmatrix} 0 \\ 1 \end{bmatrix}$

2.  $\begin{bmatrix} -0.1 & 0.1 \\ -0.25 & -0.25 \end{bmatrix}; \begin{bmatrix} -0.1 \\ -1.75 \end{bmatrix}$

3.  $\begin{bmatrix} 0.0625 & 0.125 \\ -0.075 & 0.05 \end{bmatrix}; \begin{bmatrix} -6 \\ -3 \end{bmatrix}$

4.  $\begin{bmatrix} 0.5 & 1 \\ 0.5 & 2 \end{bmatrix}; \begin{bmatrix} 7.5 \\ 12.5 \end{bmatrix}$