# 7.3 Solve Systems of Equations Using Matrices

Target 8F: Find the inverse of a matrix, if it exists, and use it to solve systems of linear equations (using technology for matrices of dimension 3 × 3 or greater).

*Review of Prior Concepts*

Find the equation of a parabola that passes through the points $(-1,9)$, $(1,5)$, and $(2,12)$ using Inverse Matrices.

**More Practice**

**Solving Systems Using Inverse Matrices**

http://www.mathplanet.com/education/algebra-2/matrices/using-matrices-when-solving-system-of-equations

http://math.uww.edu/~mcfarlat/matrix.htm

https://www.mathsisfun.com/algebra/systems-linear-equations-matrices.html

https://youtu.be/Re1F4d24Fxc

https://youtu.be/0_DYEFtlCiM

https://youtu.be/FlLsxlWD6a8

## Augmented Matrices

**Augmented Matrix** – one matrix with coefficients and answers

*Example:*

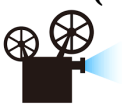
Write the system of equations as an augmented matrix: $\begin{cases} x-2y+z=7 \\ 3x-5y+z=14 \\ 2x-2y-z=3 \end{cases}$

## Solving Augmented Matrices

To solve an augmented matrix,

use Gaussian elimination to have the matrix in **R**educed **R**ow **E**chelon **F**orm.

**R**educed **R**ow **E**chelon **F**orm: $\left[\begin{array}{ccccc|c} 1 & 0 & 0 & \cdots & 0 & a_1 \\ 0 & 1 & 0 & \cdots & 0 & a_2 \\ 0 & 0 & 1 & & & \\ \vdots & \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & 0 & \cdots & 1 & a_n \end{array}\right]$



WATCH THIS VIDEO: https://youtu.be/0-feBnP7q_k

*Examples:*

menu **1.** Solve the system of equations using **R**educed **R**ow **E**chelon **F**orm:

$$\begin{cases} x - 2y + z = 7 \\ 3x - 5y + z = 14 \\ 2x - 2y - z = 3 \end{cases}$$

menu **2.** Solve the system of equations using **R**educed **R**ow **E**chelon **F**orm:

$$\begin{cases} x + y + 3z = 2 \\ 3x + 4y + 10z = 5 \\ x + 2y + 4z = 3 \end{cases}$$

menu **3.** Solve the system of equations using **R**educed **R**ow **E**chelon **F**orm:

$$\begin{cases} x - z = 2 \\ -2x + y + 3z = -5 \\ 2x + y - z = 3 \end{cases}$$

Now you try…

Solve each system of equations using **R**educed **R**ow **E**chelon **F**orm:

**1.** $\begin{cases} x + 2y + 3z = 9 \\ 2x - y + z = 8 \\ 3x - z = 3 \end{cases}$

**2.** $\begin{cases} x + z = 1 \\ x + y + z = 2 \\ x - y + z = 1 \end{cases}$

**3.** $\begin{cases} 3x + y - 6z = -10 \\ 2x + y - 5z = -8 \\ 6x - 3y + 3z = 0 \end{cases}$

## More Practice

**Augmented Matrices**

http://www.purplemath.com/modules/matrices.htm
http://www.mathbootcamps.com/augmented-matrices-and-systems-of-linear-equations/
https://braingenie.ck12.org/skills/106514
https://youtu.be/A_fIRE0NJ8Y
https://youtu.be/dHmqVGXyVG4
https://youtu.be/N9tFrUK83Uk

**Gaussian Elimination for Augmented Matrices**

https://www.mathway.com/examples/linear-algebra/systems-of-linear-equations/solving-using-an-augmented-matrix?id=227
http://tutorial.math.lamar.edu/Classes/Alg/AugmentedMatrix.aspx
https://youtu.be/WiVeiVIu_SM
https://youtu.be/2j5Ic2V7wq4

## Homework Assignment

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