

**Finding the inverse of a 3 x 3**

1.) 
$$\begin{bmatrix} 6 & 3 & -2 \\ -4 & 2 & 5 \\ -3 & -1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} -.14 & -.06 & -.54 \\ .43 & .17 & .63 \\ -.29 & .09 & -.69 \end{bmatrix}$$

**Solving Systems of 3 variables using inverse matrices**

2.) 
$$\begin{array}{l} 2x + 2z = 2 \\ 5x + 3y = 4 \\ 3y - 4z = 4 \end{array} \quad \begin{array}{l} 2x + 0y + 2z = 2 \\ 5x + 3y + 0z = 4 \\ 0x + 3y - 4z = 4 \end{array}$$

$$\begin{bmatrix} 2 & 0 & 2 \\ 5 & 3 & 0 \\ 0 & 3 & -4 \end{bmatrix}^{-1} \begin{bmatrix} 2 \\ 4 \\ 4 \end{bmatrix}$$

Solution: 
$$\begin{bmatrix} -4 \\ 8 \\ 9 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

3.) 
$$\begin{array}{l} x + 2y - 7z = -4 \\ 2x + y = -z + 13 \\ 3x - 6z = -33 - 9y \end{array} \quad \begin{array}{l} x + 2y - 7z = -4 \\ 2x + 1y + z = 13 \\ 3x + 9y - 6z = -33 \end{array}$$

$$\begin{bmatrix} 1 & 2 & -7 \\ 2 & 1 & 1 \\ 3 & 9 & -6 \end{bmatrix}^{-1} \begin{bmatrix} -4 \\ 13 \\ -33 \end{bmatrix}$$

Solution: 
$$\begin{bmatrix} 10 \\ -7 \\ 0 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

## Applications

4.) Jamie divides \$17,000 into three investments: a savings account paying 6% annual interest, a bond paying 9%, and a money market fund paying 11%. The annual interest from the three accounts is \$1540, and she has three times as much invested in the bond as in the savings account. What amount does she have invested in each account?

x: savings account

y: bond

z: money market

$$\begin{aligned} x + y + z &= 17,000 \\ .06x + .09y + .11z &= 1540 \\ 3x - y + 0z &= 0 \rightarrow (3x = y) \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ .06 & .09 & .11 \\ 3 & -1 & 0 \end{bmatrix}^{-1} \begin{bmatrix} 17000 \\ 1540 \\ 0 \end{bmatrix}$$

She invested \$3,000 in the savings account,  
\$9,000 in the bond, and  
\$5,000 in the money market.

5.) In the 2008 Women's NCAA Final Four Championship game, the University of Tennessee Lady Volunteers defeated the University of Stanford Cardinal by a score of 64 to 48. The Lady Volunteers won by scoring a combination of two-point baskets, three-point baskets, and one-point free throws. The number of two-point baskets was two more than the number of free throws. The number of free throws was two more than five times the number of three-point baskets. What combination of scoring accounted for the Lady Volunteers' 64 points?

x: one-point free throws

y: two-point baskets

z: three-point baskets

$$1x + 2y + 3z = 64$$

$$y = 1x + 2$$

$$x = 5z + 2$$

$$\begin{aligned} 1x + 2y + 3z &= 64 \\ -1x + 1y + 0z &= 2 \\ 1x + 0y - 5z &= 2 \end{aligned} \rightarrow \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 0 \\ 1 & 0 & -5 \end{bmatrix}^{-1} \begin{bmatrix} 64 \\ 2 \\ 2 \end{bmatrix}$$

They shot 17 free throws, 19 one-pointers, and 3 three-pointers.