



# **Lesson 9**

## **Matrices and the TI-nspire**

## Entering a Matrix

1. Press  and choose (A) Calculate
2. Press 
3. Enter the number of rows and columns
4. Move to each element in the matrix and type the appropriate value in each cell.

## Matrix Operations

You can perform operations on matrices just as numbers!

- Adding
- Subtracting
- Multiplying
- Inverse



$$\begin{bmatrix} 4 & -1 & 3 \\ -11 & 0 & 12 \\ 9 & 19 & 7 \end{bmatrix} + \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 5 \\ 5 & 6 & 7 \end{bmatrix} = \begin{bmatrix} 5 & 1 & 6 \\ -8 & 4 & 17 \\ 14 & 25 & 14 \end{bmatrix}$$

$$\begin{bmatrix} 13 & 3 & 98 & 9 \\ 17 & 63 & 5 & 25 \\ 63 & 7 & 19 & 84 \end{bmatrix} - \begin{bmatrix} 9 & 9 & 65 & 7 \\ 10 & 26 & 1 & 7 \\ 27 & 10 & 3 & 17 \end{bmatrix} = \begin{bmatrix} 4 & -6 & 33 & 2 \\ 7 & 37 & 4 & 18 \\ 36 & -3 & 16 & 67 \end{bmatrix}$$

$$\frac{2}{3} \cdot \begin{bmatrix} 1 & -4 \\ 2 & 11 \end{bmatrix} \quad \begin{bmatrix} \frac{2}{3} & \frac{-8}{3} \\ \frac{4}{3} & \frac{22}{3} \\ \frac{2}{3} & \frac{2}{3} \end{bmatrix}$$

$$\begin{bmatrix} -1 & 0 & 2 \\ 4 & 3 & 6 \\ 6 & 7 & 9 \end{bmatrix}^{-1} \quad \begin{bmatrix} \frac{-3}{7} & \frac{2}{5} & \frac{-6}{35} \\ 0 & \frac{-3}{5} & \frac{2}{5} \\ \frac{2}{7} & \frac{1}{5} & \frac{-3}{35} \end{bmatrix}$$

## Solving Systems of Equations

■ Set up  $\begin{bmatrix} \text{Coefficient} \\ \text{Matrix } (A) \end{bmatrix} \times \begin{bmatrix} \text{Matrix of} \\ \text{Variables } (x) \end{bmatrix} = \begin{bmatrix} \text{Matrix of} \\ \text{Constants } (B) \end{bmatrix}$

■ In the calculator enter  $\begin{bmatrix} \text{Coefficient} \\ \text{Matrix } (A) \end{bmatrix}^{-1} \begin{bmatrix} \text{Matrix of} \\ \text{Constants } (B) \end{bmatrix}$

$$2x - 5y + z = 19$$

$$4x + 7y - z = -13$$

$$-18x - 9y + 6z = 27$$

$$\begin{bmatrix} 2 & -5 & 1 \\ 4 & 7 & -1 \\ -18 & -9 & 6 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 19 \\ -13 \\ 27 \end{bmatrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 & -5 & 1 \\ 4 & 7 & -1 \\ -18 & -9 & 6 \end{bmatrix}^{-1} \begin{bmatrix} 19 \\ -13 \\ 27 \end{bmatrix} = \begin{bmatrix} \frac{50}{31} \\ -\frac{57}{31} \\ \frac{204}{31} \end{bmatrix}$$