

## 5.1 Matrix

## Matrices

$$\begin{array}{c} R_1 \\ R_2 \end{array} \begin{array}{c} C_1 \quad C_2 \quad C_3 \\ \left[ \begin{array}{ccc} 2 & 1 & -3 \\ 5 & 0 & 4 \end{array} \right] \end{array}$$

Order Dimensions

Rows x Columns

2 x 3

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

$$a_{12} = 2$$

 $a_{ij}$ 

 Row 1  
 Column 2

## Reduced Row Echelon Form

$$\left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 5 & -3 & 4 & 0 \\ 2 & 4 & 0 & 6 \end{array} \right] \begin{array}{l} x+10y-3z=2 \\ 5x-3y+4z=0 \\ 2x+4y=6 \end{array}$$

$$\left[ \begin{array}{ccc|c} x & y & z & c \\ 1 & 0 & 0 & \# \\ 0 & 1 & 0 & \# \\ 0 & 0 & 1 & \# \end{array} \right] \begin{array}{l} x= \\ y= \\ z= \end{array}$$

$$R_1 \cdot 5 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 5 & -3 & 4 & 0 \\ 2 & 4 & 0 & 6 \end{array} \right]$$

$$+ R_2 \\ \text{New } R_2 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 0 & -53 & 19 & -10 \\ 2 & 4 & 0 & 6 \end{array} \right]$$

$$R_2 \cdot \frac{1}{53} \\ \text{New } R_2 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 0 & 1 & \frac{-19}{53} & \frac{-10}{53} \\ 2 & 4 & 0 & 6 \end{array} \right]$$

$$R_1 \cdot 2 \\ + R_3 \\ \text{New } R_3 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 0 & 1 & \frac{-19}{53} & \frac{-10}{53} \\ 0 & -16 & 6 & 2 \end{array} \right]$$

$$R_2 \cdot 16 \\ + R_3 \\ \text{New } R_3 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 0 & 1 & \frac{-19}{53} & \frac{-10}{53} \\ 0 & 0 & \frac{16}{53} & \frac{266}{53} \end{array} \right]$$

$$R_3 \cdot \frac{53}{16} \\ \text{New } R_3 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 0 & 1 & \frac{-19}{53} & \frac{-10}{53} \\ 0 & 0 & 1 & 19 \end{array} \right]$$

$$R_3 \cdot \frac{19}{53} \\ + R_2 \\ \text{New } R_2 \quad \left[ \begin{array}{ccc|c} 1 & 10 & -3 & 2 \\ 0 & 1 & 0 & 7 \\ 0 & 0 & 1 & 19 \end{array} \right]$$

$$R_3 \cdot 3 \\ + R_1 \\ \text{New } R_1 \quad \left[ \begin{array}{ccc|c} 1 & 10 & 0 & 59 \\ 0 & 1 & 0 & 7 \\ 0 & 0 & 1 & 19 \end{array} \right]$$

$$R_2 \cdot -10 \\ + R_1 \\ \text{New } R_1 \quad \left[ \begin{array}{ccc|c} x & y & z & c \\ 1 & 0 & 0 & -11 \\ 0 & 1 & 0 & 7 \\ 0 & 0 & 1 & 19 \end{array} \right] \begin{array}{l} x=-11 \\ y=7 \\ z=19 \end{array}$$