

Determinants  
(comprised of rows and columns  
in a matrix)

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \Rightarrow 2 \times 2$$

$$\Rightarrow \left. \begin{array}{l} \# \text{ of rows} = 2 \\ \# \text{ of columns} = 2 \end{array} \right\} \text{Order } R \times C$$

$$B = \begin{bmatrix} a & b & c & d \\ 2 & 3 & 4 & -2 \end{bmatrix} \Rightarrow \text{Order: } 2 \times 4 \quad C = \begin{bmatrix} 2 & -1 \\ 2 & 5 \end{bmatrix}$$

Matrices: Add } orders must  
Subtract } match

$$A + C = \begin{bmatrix} a+1 & b-1 \\ c+2 & d+5 \end{bmatrix}$$

Scalar  $\Rightarrow$  a number

$$\text{What is } 3[B] = \begin{bmatrix} 3a & 3b & 3c & 3d \\ 6 & 9 & 12 & -6 \end{bmatrix}$$

To multiply matrices, you must check the orders of each.

Ex:  $A = \begin{bmatrix} 1 & 2 \\ -3 & 17 \end{bmatrix}$   $B = \begin{bmatrix} 2 & -1 & 0 & 6 \\ 8 & -2 & -1 & -5 \end{bmatrix}$

$$AB = 2 \times 4 \Rightarrow \begin{bmatrix} (1)(2) + 2(8) & 1(-1) + 2(-2) & (1)(0) + 2(-1) & 1(6) + 2(5) \\ (-3)(2) + 17(8) & (-3)(-1) + 17(2) & -3(0) + 17(-1) & -3(6) + 17(5) \end{bmatrix}$$

$$= \begin{bmatrix} 18 & -5 & -2 & -4 \\ 130 & -31 & -17 & -103 \end{bmatrix}$$

$$BA \Rightarrow 2 \times 4 \quad 2 \times 2 \Rightarrow \text{No solution}$$

Determinants

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \Rightarrow \det[A] = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = (1) - (2)$$

$\det A$

$$\det A = 1 - 0 \\ = 1$$

$$J = \begin{vmatrix} \overset{+}{A} & \overset{-}{B} & \overset{+}{C} \\ 2 & 3 & 5 \\ 1 & 2 & 3 \end{vmatrix} \Rightarrow \det[J] =$$
$$A(9-10) - B(6-5) + C(4-3)$$
$$-A - B + C$$

$$\begin{aligned}x^2 + 2x + y^2 - 2y + z^2 &= 2 \\(x^2 + 2x + 1) + (y^2 - 2y + 1) + z^2 &= 2 + 1 + 1 \\(x+1)^2 + (y-1)^2 + z^2 &= 4 \\C: (-1, 1, 0) \quad r=2\end{aligned}$$

