Objective - To multiply two matrices.

Two matrices may be multiplied if the number of columns in the first matrix is equal to the number rows in the second matrix.

$$AB = \underset{2\times 4}{\begin{bmatrix} 1 & 7 & -8 & 0 \\ 4 & 3 & 2 & 1 \end{bmatrix}} \underset{4\times 2}{\begin{bmatrix} 2 & 3 \\ 7 & 8 \\ 3 & 7 \\ 1 & 9 \end{bmatrix}}$$

Dimensions of Product 2×2

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix}$$

$$\begin{matrix} 2 \times 2 & \quad & 2 \times 2 \end{matrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 2(5) + 9(2) & \\ & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & \\ & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix}\begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 2(8)+9(3) \\ & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 43 \\ & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 43 \\ 7(5)+8(2) & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 43 \\ 51 & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 43 \\ 51 & 7(8)+8(3) \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 43 \\ 51 & 80 \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 2 & 9 \\ 7 & 8 \end{bmatrix} \begin{bmatrix} 5 & 8 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 28 & 43 \\ 51 & 80 \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} -2 & 3 & 8 \\ 0 & 2 & 7 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ 3 & -5 \\ 1 & 7 \end{bmatrix}$$

$$\underset{}{2 \times 3} \qquad \qquad 3 \times 2$$

Multiplying Matrices

$$AB = \begin{bmatrix} -2 & 3 & 8 \\ 0 & 2 & 7 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ 3 & -5 \\ 1 & 7 \end{bmatrix}$$

$$AB = \begin{bmatrix} -2(1) + 3(3) + 8(1) & \\ & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} -2 & 3 & 8 \\ 0 & 2 & 7 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ 3 & -5 \\ 1 & 7 \end{bmatrix}$$

$$AB = \begin{bmatrix} -2(1) + 3(3) + 8(1) & -2(-2) + 3(-5) + 8(7) \\ & \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} -2 & 3 & 8 \\ 0 & 2 & 7 \end{bmatrix} \begin{bmatrix} 1 & -2 \\ 3 & -5 \\ 1 & 7 \end{bmatrix}$$

$$AB = \begin{bmatrix} 15 & 45 \\ 13 & 39 \end{bmatrix}$$

Multiplying Matrices

$$AB = \begin{bmatrix} 1 & 5 & 8 \\ 3 & 2 & 7 \\ -2 & 3 & 5 \end{bmatrix} \begin{bmatrix} 9 & 0 & 76 & 9 \\ 4 & -9 & -5 & 3 \\ 51 & 5 & 9 & 6 \\ 31 & 9 & 0 & 5 \end{bmatrix}$$

$3 \times 3 \longleftrightarrow 4 \times 4$

Not Defined

Multiplying Matrices

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

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

Multiplying Matrices

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

$$AB = \begin{bmatrix} 11 & 12 & -9 \\ -6 & -18 & 40 \end{bmatrix}$$