

7.2 DAY 2: MATRIX MULTIPLICATION

- the columns of the first matrix must equal the rows of the second matrix *
- to find the product of 2 matrices, multiply the row of the first matrix by the column of the second matrix
- the resulting matrix will have the same # of rows as the first matrix & # of columns as the 2nd matrix

example 1: $\begin{bmatrix} 2 & -1 \\ 1 & -2 \end{bmatrix} \times \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} 2(-1) + (-1)(-2) & 2(3) + (-1)(4) \\ 1(-1) + (-2)(-2) & 1(3) + (-2)(4) \end{bmatrix} = \begin{bmatrix} 0 & 2 \\ 3 & -5 \end{bmatrix}$

example 2: $\begin{bmatrix} 1 & -2 \\ 3 & 4 \\ -5 & 6 \end{bmatrix} \times \begin{bmatrix} 4 & -3 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} 1(4) + (-2)(-2) & 1(-3) + (-2)(1) \\ 3(4) + 4(-2) & 3(-3) + 4(1) \\ -5(4) + 6(-2) & -5(-3) + 6(1) \end{bmatrix} = \begin{bmatrix} 8 & -5 \\ 4 & -5 \\ -32 & 21 \end{bmatrix}$

example 3: $\begin{bmatrix} 2 & 3 & 4 \\ -1 & -2 & 5 \end{bmatrix} \times \begin{bmatrix} 0 & 1 & -6 \\ 2 & 1 & -3 \end{bmatrix} = \text{not possible!}$

you try! $\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \times \begin{bmatrix} -3 & 0 \\ -2 & 1 \\ 4 & 5 \end{bmatrix} = [1(-3) + 2(-2) + 3(4) \quad 1(0) + 2(1) + 3(5)] = [5 \quad 17]$

Is matrix multiplication possible? Explain why or why not & provide the product matrix if possible. Then include the matrix order.

Yes \Rightarrow there are 4 columns in the 1st M. & 4 rows in the 2nd M.

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

$\boxed{3 \times 1}$