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Multiplying Matrices

South Wood County Youth Hockey Association

$$\begin{array}{l|cc|} & \text{Pucks} & \text{Uniforms} \\ \text{Mini Mite} & 31 & 30 \\ \text{Mite} & 32 & 28 \\ \text{Squirt} & 20 & 18 \\ \text{Peewee} & 21 & 22 \\ \text{Bantam} & 25 & 15 \end{array} \quad \times \quad \begin{array}{l|c|} & \text{Cost} \\ \text{Pucks} & 2 \\ \text{Uniforms} & 50 \end{array}$$

$$\begin{bmatrix} 31 \cdot 2 + 30 \cdot 50 \\ 32 \cdot 2 + 28 \cdot 50 \\ 20 \cdot 2 + 18 \cdot 50 \\ 21 \cdot 2 + 22 \cdot 50 \\ 25 \cdot 2 + 15 \cdot 50 \end{bmatrix} = \begin{array}{l|c|} & \text{Cost} \\ \text{Mini Mite} & 1562 \\ \text{Mite} & 1464 \\ \text{Squirt} & 940 \\ \text{Peewee} & 1142 \\ \text{Bantam} & 800 \end{array}$$

Multiplying Matrices

$$\text{Row} \times \underline{\underline{\text{Column}}} \quad \times \quad \underline{\underline{\text{Row}}} \times \text{Column}$$

Must be the same.

For example: $5 \times \underline{\underline{2}} \quad \times \quad \underline{\underline{2}} \times 1$

Answer matrix = 5×1

$2 \times \underline{\underline{1}} \quad \times \quad \underline{\underline{5}} \times 2$ cannot be multiplied

Multiplying Matrices (cont.)

$$\begin{bmatrix} 2 & 3 & 6 \\ 4 & 5 & 7 \end{bmatrix} \times \begin{bmatrix} 8 \\ 9 \\ 10 \end{bmatrix}$$

Can these be multiplied? Yes

Answer: 2x1 $\begin{bmatrix} \underline{\quad} \\ \underline{\quad} \end{bmatrix}$

$\underline{2}$ x [redacted] X [redacted] x $\underline{1}$

$$\begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix}$$

Can these be multiplied? NO.

$\underline{2}$ x [redacted] X [redacted] x $\underline{2}$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix}$$

Can these be multiplied? Yes

Answer: 3x2 $\begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$

$\underline{3}$ x [redacted] X [redacted] x $\underline{2}$

Example:

$$\overset{3\times 2}{\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix}} \times \overset{2\times 2}{\begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix}} = \overset{3\times 2}{\begin{bmatrix} \underline{-13} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{3} \\ \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{2} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{-3} \\ \underline{\quad} & \underline{\quad} \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \\ \underline{7} & \underline{\quad} \end{bmatrix}$$

$$\begin{bmatrix} 2 & -3 \\ -1 & 0 \\ 4 & 5 \end{bmatrix} \times \begin{bmatrix} -2 & 3 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{\quad} \\ \underline{\quad} & \underline{17} \end{bmatrix}$$

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

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

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

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