Matrix Multiplication Practice Solutions

$\begin{pmatrix}14\\10\end{pmatrix}$ $\begin{pmatrix}-11\\-3\end{pmatrix}$ $\begin{pmatrix}12\\3\end{pmatrix}$ $\begin{pmatrix}3\\3\end{pmatrix}$

$\begin{pmatrix}0\\0\end{pmatrix}$ $\begin{pmatrix}5\\1\end{pmatrix}$ $\begin{pmatrix}0\\1\end{pmatrix}$ $\begin{pmatrix}0\\0\end{pmatrix}$

$\begin{pmatrix}2\\14\\-7\end{pmatrix}$ $\begin{pmatrix}x+3y+z\\y+z\\x+4y+2z\end{pmatrix}$ Not defined.

$\begin{pmatrix}2\\1\\3\end{pmatrix}$ $\begin{pmatrix}-1\\2\\1\end{pmatrix}$ $\begin{pmatrix}3\\1\\2\end{pmatrix}$

$\begin{pmatrix}5\\16\\9\end{pmatrix}$ $\begin{pmatrix}2&-1&1\\1&2&1\\3&1&2\end{pmatrix}$ $\begin{pmatrix}2&-1&1\\1&2&1\\3&1&2\end{pmatrix}$

$\begin{pmatrix}1\\2\\3\end{pmatrix}$ $\begin{pmatrix}a\\2b\\3c\end{pmatrix}$ $\begin{pmatrix}1&0&0\\0&4&0\\0&0&9\end{pmatrix}$

$\begin{pmatrix}3&0&0\\0&4&0\\0&0&3\end{pmatrix}$ $\begin{pmatrix}a\\b\\c\end{pmatrix}$ $\begin{pmatrix}ae&0&0\\0&bf&0\\0&0&cg\end{pmatrix}$

$\begin{pmatrix}2&-1&1\\2&4&2\\9&3&6\end{pmatrix}$ $\begin{pmatrix}2&-2&3\\1&4&3\\3&2&6\end{pmatrix}$ $\begin{pmatrix}a&a&a\\b&b&b\\c&c&c\end{pmatrix}$

$\begin{pmatrix} 1 \\ -2 \\ 2 \\ 1 \end{pmatrix}$ $\begin{pmatrix} 2 \\ 2 \\ 5 \\ 5 \end{pmatrix}$ Not defined.

Let

$$A = \begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 1 \\ 1 & 0 & 3 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 1 & -2 \\ 2 & -2 & -1 \\ 1 & 1 & 4 \end{pmatrix}, \quad C = \begin{pmatrix} 1 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 0 \end{pmatrix}$$

$$AB = \begin{pmatrix} 1 & 5 & 7 \\ 3 & -1 & 3 \\ 4 & 4 & 10 \end{pmatrix}, \quad BA = \begin{pmatrix} -1 & 0 & -3 \\ 1 & -4 & -1 \\ 5 & 0 & 15 \end{pmatrix}, \quad A(BC) = \begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 1 \\ 1 & 0 & 3 \end{pmatrix} \begin{pmatrix} 1 & -1 & 3 \\ -3 & -4 & 2 \\ 7 & 11 & 3 \end{pmatrix} = \begin{pmatrix} 18 & 25 & 7 \\ 4 & 7 & 5 \\ 22 & 32 & 12 \end{pmatrix}$$

$$(AB)C = \begin{pmatrix} 1 & 5 & 7 \\ 3 & -1 & 3 \\ 4 & 4 & 10 \end{pmatrix} \begin{pmatrix} 1 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 0 \end{pmatrix} = \begin{pmatrix} 18 & 25 & 7 \\ 4 & 7 & 5 \\ 22 & 32 & 12 \end{pmatrix}, \quad A^3 = \begin{pmatrix} 3 & -2 & 7 \\ 1 & 1 & 4 \\ 4 & -1 & 11 \end{pmatrix} \begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 1 \\ 1 & 0 & 3 \end{pmatrix} = \begin{pmatrix} 10 & -5 & 25 \\ 5 & 0 & 15 \\ 15 & -5 & 40 \end{pmatrix}$$

$\begin{pmatrix} -3 & -2 & -4 \\ 1 & 0 & 3 \\ 0 & 0 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 0 & -1 \\ -1 & 1 & 0 \\ 0 & 2 & 2 \end{pmatrix}$ $\begin{pmatrix} 8 & -7 \\ 2 & 11 \\ 6 & 3 \end{pmatrix}$

$\begin{pmatrix} 2 & 3 & -7 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ $\begin{pmatrix} 4 & 6 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ $\begin{pmatrix} 10 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

$\begin{pmatrix} 0 & 0 & 0 \\ 2 & 3 & -7 \\ 0 & 0 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 0 & 0 \\ 4 & 6 & 0 \\ 0 & 0 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 0 & 0 \\ 10 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

$\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 2 & 3 & -7 \end{pmatrix}$ $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 4 & 6 & 0 \end{pmatrix}$ $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 10 & 1 & 0 \end{pmatrix}$

$\begin{pmatrix} -30 & 24 \\ 15 & -12 \end{pmatrix}$ (-42) $\begin{pmatrix} -12 \\ 6 \end{pmatrix}$ $\begin{pmatrix} -84 \\ -84 \end{pmatrix}$

$\begin{pmatrix} -10 & -20 \\ 13 & -16 \\ 23 & -24 \end{pmatrix}$ Not defined. $\begin{pmatrix} -18 & -24 & 10 \\ -2 & -32 & -16 \\ -20 & -20 & 15 \end{pmatrix}$

$\begin{pmatrix} -14 & -19 \\ -27 & -18 \end{pmatrix}$

Not defined.

$\begin{pmatrix} 0 & 0 & 0 \\ 1 & 2 & 7 \\ -5 & -10 & -35 \end{pmatrix}$

$\begin{pmatrix} -33 \end{pmatrix}$

$\begin{pmatrix} -7 & -11 \\ 10 & 13 \\ 17 & 60 \\ 0 & -61 \end{pmatrix}$

$\begin{pmatrix} -26 & -4 & -16 \\ 23 & -8 & 13 \\ -10 & 10 & -5 \\ -38 & 8 & -22 \end{pmatrix}$

$\begin{pmatrix} x^2 - 2xz + 2y^2 + 4yz + 3z^2 \end{pmatrix}$