Name_____Daily Quiz

Finding any Determinant and using technology to find inverse matrices and solve matrix equations

Helpful link https://www.desmos.com/matrix

Find the determinant and the inverse matrix of each of the following matrices using technology

Page 1

$\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}$ has determinant $\det\left(\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}\right) = 10$

$\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}$ has inverse $\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}^{-1} = \begin{bmatrix}\frac{-7}{5} & \frac{-16}{5} & \frac{12}{5}\\\frac{11}{5} & \frac{23}{5} & \frac{-16}{5}\\\frac{-3}{10} & \frac{-2}{5} & \frac{3}{10}\end{bmatrix}$

Given Matrix Equation $\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}\cdot\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}85\\-62\\-31\end{bmatrix}$

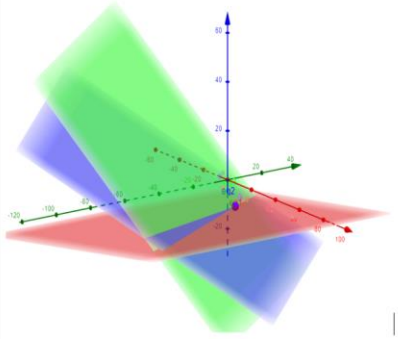
Apply the Inverse $\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}^{-1}\cdot\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}\cdot\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}^{-1}\cdot\begin{bmatrix}85\\-62\\-31\end{bmatrix}$

This results in Identity Matrix $\begin{bmatrix}1 & 0 & 0\\0 & 1 & 0\\0 & 0 & 1\end{bmatrix}\cdot\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}5\\1\\-10\end{bmatrix}$

This is the solution $\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}5\\1\\-10\end{bmatrix}$

This is the double check of the solution $\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}\cdot\begin{bmatrix}5\\1\\-10\end{bmatrix} = \begin{bmatrix}85\\-62\\-31\end{bmatrix}$

The purple point (5, 1, −10) is the solution to $\begin{bmatrix}1 & 0 & -8\\3 & 3 & 8\\5 & 4 & 6\end{bmatrix}\cdot\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}85\\-62\\-31\end{bmatrix}$



https://www.geogebra.org/3d/frn58cam

Find the determinant and the inverse matrix of each of the following matrices using technology

Page 2

$\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix}$ has determinant $\det\left(\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix}\right) = -30$

$\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix}$ has inverse $\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix}^{-1} = \begin{bmatrix} 30 & \frac{7}{3} & \frac{-17}{3} & \frac{2}{3} \\ \frac{-473}{10} & \frac{-53}{15} & \frac{55}{6} & \frac{-16}{15} \\ 29 & \frac{7}{3} & \frac{-17}{3} & \frac{2}{3} \\ \frac{79}{10} & \frac{3}{5} & \frac{-3}{2} & \frac{1}{5} \end{bmatrix}$

Given Matrix Equation $\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} -6 \\ -21 \\ -18 \\ 195 \end{bmatrix}$

Apply the Inverse $\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix}^{-1} \cdot \begin{bmatrix} -6 \\ -21 \\ -18 \\ 195 \end{bmatrix}$

This results in the Identity Matrix $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} 3 \\ -15 \\ 9 \\ 6 \end{bmatrix}$

This is the solution $\begin{bmatrix} x \\ y \\ z \\ w \end{bmatrix} = \begin{bmatrix} 3 \\ -15 \\ 9 \\ 6 \end{bmatrix}$

This is the double check of the solution $\begin{bmatrix} 1 & 0 & -1 & 0 \\ 2 & 4 & 5 & -2 \\ 5 & 2 & -3 & 4 \\ -8 & 3 & 2 & 41 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -15 \\ 9 \\ 6 \end{bmatrix} = \begin{bmatrix} -6 \\ -21 \\ -18 \\ 195 \end{bmatrix}$