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Geometria Analitica.

Tarea VIII

Dado $v = \begin{pmatrix}1\\2\\3\end{pmatrix}$ calcular $\vec{w_1}$ y $\vec{w_2}$ tales que:

$v \cdot w_1 = 0$

$v \cdot w_2 = 0$

$w_1 \cdot w_2 = 0$

Como $v \cdot w_1 = 0$

$(1, 2, 3) \cdot (w_1) = 0 \Rightarrow$ si $w_1 = (\alpha, \beta, \gamma)$

$0 = \alpha + 2\beta + 3\gamma$

Si $\beta = 0$ entonces $\alpha + 3\gamma = 0 \Rightarrow -3\gamma = \alpha$

Entonces $w_1 = \begin{pmatrix}-3\gamma\\0\\\gamma\end{pmatrix} = \gamma\begin{pmatrix}-3\\0\\1\end{pmatrix}$

Si $\gamma = 0 \Rightarrow w_1 = \alpha + 2\beta = 0$

$\alpha = -2\beta$

$w_1 = \begin{pmatrix}-2\beta\\\beta\\0\end{pmatrix} = \beta\begin{pmatrix}-2\\1\\0\end{pmatrix}$

El vector $\gamma\begin{pmatrix}-3\\0\\1\end{pmatrix}$ y el vector $\beta\begin{pmatrix}-2\\1\\0\end{pmatrix}$ son linealmente dependientes, por lo tanto generan un plano perpendicular al vector v.

$v_1 \perp \gamma\begin{pmatrix}-3\\0\\1\end{pmatrix} + \beta\begin{pmatrix}-2\\1\\0\end{pmatrix}$ si $\gamma = 1$, $\beta = -2$

$\Rightarrow v_1 \perp \begin{pmatrix}1\\-2\\1\end{pmatrix}$

De esta manera el vector w_2 debe pertenecer al plano y al mismo tiempo ser perpendicular a w_1

$$w_2 \cdot w_1 = 0$$

$$\begin{pmatrix}-3\gamma - 2\beta\\\beta\\\gamma\end{pmatrix} \cdot \begin{pmatrix}1\\-2\\1\end{pmatrix} = 0$$

$$-3\gamma - 2\beta - 2\beta + \gamma = 0$$

$$-4\beta - 2\gamma = 0$$

$$\beta = -2 \qquad \gamma = 4$$

$$w_2 = \begin{pmatrix}-4\\-1\\2\end{pmatrix} \qquad w_1 = \begin{pmatrix}1\\-2\\1\end{pmatrix}$$