Answer on Question #44080, Math, Vector Calculus

If a $\vec{}$=(0,1 ,-1) and c $\vec{}$= (1, 1, 1) are given vectors, then find a vector b $\vec{}$ satisfying a $\vec{}$×b $\vec{}$+c $\vec{}$ = 0 and a $\vec{}$.b $\vec{}$ = 3.

<u>Solution.</u>

Assume that vector $\vec{b}$ has coordinates (x, y, z). Then $\vec{a} \times \vec{b} + \vec{c} = \begin{vmatrix} i & j & k \\ 0 & 1 & -1 \\ x & y & z \end{vmatrix} + (1,1,1) =$

$i(z + y) - jx - kx + (1,1,1) = (1 + y + z, 1 - x, 1 - x) = (0,0,0).$

Also, $\vec{a} \cdot \vec{b} = 0 \cdot x + 1 \cdot y - 1 \cdot z = y - z = 3.$

Now we solve the system of equations:

$\begin{cases} 1 + y + z = 0, \\ 1 - x = 0, \\ y - z = 3; \end{cases}$ $\begin{cases} 1 + (z + 3) + z = 0, \\ x = 1, \\ y = z + 3; \end{cases}$ $\begin{cases} z = -2, \\ x = 1, \\ y = 1. \end{cases}$

Hence, $\vec{b} = (1,1,-2).$

<u>Answer</u>: $(1,1,-2).$