Answer on Question #39975 – Math – Other

1. For The Vector a b c and d show that :
   (axb).(cxd)+(bxc).(axd)+(cxa).(bxd)=o
2. Find Two Unit vector Perpendicular to both
   A=i-2j+3k
   B= -2i+4j

Soluiton:

1. Using property:
   (axb).(cxd)=(axb) ·p={let p=cxd}=a·(bxp)={ as in a scalar triple product the dot and the cross may be interchanged)= a·[bx(cxd)]=a·[(b·d)c-(b·c)d]=(a·c)(b·d)-(a·d)(b·c) =$\begin{vmatrix} a\cdot c & a\cdot d \\ b\cdot c & b\cdot d \end{vmatrix}$ we obtain (axb).(cxd)+(bxc).(axd)+(cxa).(bxd)=(c·b)(a·d)-(c·d)(a·b)+(b·a)(c·d)-(b·d)(c·a)+(a·c)(b·d)-(a·d)(b·c)=0, that is ***answer*** .
2. Let find vector c=A×B. c is Perpendicular to both A and B.

A×B=$\begin{pmatrix} i & j & k \\ 1 & -2 & 3 \\ -2 & 4 & 0 \end{pmatrix} = i\begin{pmatrix} -2 & 3 \\ 4 & 0 \end{pmatrix} - j\begin{pmatrix} 1 & 3 \\ -2 & 0 \end{pmatrix} + k\begin{pmatrix} 1 & -2 \\ -2 & 4 \end{pmatrix} =$
$= i(-12) - j(6) + k(4-4) = \boldsymbol{-12i - 6j.}$

So, vector c={-12;-6} - is perpendicular to the vectors A and B.

Since we need Two Unit Perpendicular vectors, so let c_1={12;6}

Answer: 2. {-12;-6}, {12;6}