Tarea 8 Unidad 2

88. Suponga que A = i - 2j - 3k, B = 2i + j - k y C = i + 3j - 2k. Calcule:

a) |(AXB)XC|

$$(AXB) = \begin{pmatrix} i & j & k \\ 1 & -2 & -3 \\ 2 & 1 & -1 \end{pmatrix} = \begin{pmatrix} -2 & -3 \\ 1 & -1 \end{pmatrix} i - \begin{pmatrix} 1 & -3 \\ 2 & -1 \end{pmatrix} j + \begin{pmatrix} 1 & -2 \\ 2 & 1 \end{pmatrix} k$$

(AXB) = [(-2) (-1) - (-3) (1)] i – [(1) (-1) - (-3) (2)] j + [(1) (1) - (-2) (2)] k

(AXB) = (2+3) i – (-1+6) j + (1+4) k

(AXB) = 5i -5j + 5k

$$(5i - 5j + 5k)XC = \begin{pmatrix} i & j & k \\ 5 & -5 & 5 \\ 1 & 3 & -2 \end{pmatrix} = \begin{pmatrix} -5 & 5 \\ 3 & -2 \end{pmatrix} i - \begin{pmatrix} 5 & 5 \\ 1 & -2 \end{pmatrix} j + \begin{pmatrix} 5 & -5 \\ 1 & 3 \end{pmatrix} k$$

(5i -5j + 5k)XC = [(-5) (-2) – (5) (3)] i – [(5) (-2) – (5) (1)] j + [(5) (3) – (-5) (1)] k

(5i -5j + 5k)XC = (10-15) i – (-10-5) j + (15+5) k = -5i +15j + 20k

$|-5i + 15j + 10k| = \sqrt{(-5)^2 + (15)^2 + (10)^2} = \sqrt{25 + 225 + 400} = \sqrt{650} = \boxed{5\sqrt{26}}$

b) |AX(BXC)|

$$(BXC) = \begin{pmatrix} i & j & k \\ 2 & 1 & -1 \\ 1 & 3 & -2 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ 3 & -2 \end{pmatrix} i - \begin{pmatrix} 2 & -1 \\ 1 & -2 \end{pmatrix} j + \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix} k$$

(BXC) = [(1) (-2) – (-1) (3)] i – [(2) (-2) – (1) (-1)] j + [(2) (3) – (1) (1)] k

(BXC) = (-2+3) i – (-4+1) j + (6-1) k = i + 3j + 5k

$$AX(i + 3j\ 5k) = \begin{pmatrix} i & j & k \\ 1 & -2 & -3 \\ 1 & 3 & 5 \end{pmatrix} = \begin{pmatrix} -2 & -3 \\ 3 & 5 \end{pmatrix} i - \begin{pmatrix} 1 & -3 \\ 1 & 5 \end{pmatrix} j + \begin{pmatrix} 1 & -2 \\ 1 & 3 \end{pmatrix} k$$

AX(i + 3j 5k) = [(-2) (5) – (-3) (3)] i – [(1) (5) – (-3) (1)] j + [(1) (3) – (-2) (1)] k

AX(i + 3j 5k) = (-10+9) i – (5+3) j + (3+2) k = - i - 8j + 5k

$|- i - 8j + 5k| = \sqrt{(-1)^2 + (-8)^2 + (5)^2} = \sqrt{1+64+25} = \sqrt{90} = \boxed{3\sqrt{10}}$

c) A · (BXC)

$$(BXC) = \begin{pmatrix} i & j & k \\ 2 & 1 & -1 \\ 1 & 3 & -2 \end{pmatrix} = \begin{pmatrix} 1 & -1 \\ 3 & -2 \end{pmatrix} i - \begin{pmatrix} 2 & -1 \\ 1 & -2 \end{pmatrix} j + \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix} k$$

(BXC) = [(1) (-2) – (3) (-1)] i – [(2) (-2) – (-1) (1)] j [(2) (3) – (1) (1)] k

(BXC) = (-2+3) i – (-4+1) j + (6-1) k = i + 3j + 5k

A · i + 3j + 5k = (1) (1) + (-2) (3) + (-3) (5) = 1-6-15 = $\boxed{-20}$

d) (AXB)·C

(AXB) = 5i -5j +5k

(AXB) · C = (5) (1) + (-5) (3) + (5) (-2) = 5-15-10 = $\boxed{-20}$

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e) (AXB)X(BXC)

(AXB) = 5i -5j +5k

(BXC) = i +3j + 5k

(5i -5j +5k)X(i +3j + 5k) = $\begin{pmatrix} i & j & k \\ 5 & -5 & 5 \\ 1 & 3 & 5 \end{pmatrix} = \begin{pmatrix} -5 & 5 \\ 3 & 5 \end{pmatrix} i - \begin{pmatrix} 5 & 5 \\ 1 & 5 \end{pmatrix} j + \begin{pmatrix} 5 & -5 \\ 1 & 3 \end{pmatrix} k$

(5i -5j +5k)X(i +3j + 5k) = [(-5) (5) – (5) (3)] i – [(5) (5) – (5) (1)] j + [(5) (3) – (-5) (1)] k

(5i -5j +5k)X(i +3j + 5k) = (-25-15) i – (25-5) j + (15+5) k = -40 i -20 j + 20 k

f) (AXB)X(B·C)

AXB = 5i -5j + 5k

B·C = (2) (1) + (1) (3) + (-1) (-2) = 2+3+2 = 7

No se puede