

**Answer on Question #46931 – Math – Vector Calculus**

Evaluate the vectors  $(2i - 3j) \cdot [(i + j - k) \times (3i - k)]$

7  
4  
6  
2

**Solution**

Let's calculate the cross product:

$$\begin{aligned} [(i + j - k) \times (3i - k)] &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 1 & 1 & -1 \\ 3 & 0 & -1 \end{vmatrix} = 1 \cdot (-1) \cdot \mathbf{i} + (-1) \cdot 3 \cdot \mathbf{j} - 3 \cdot 1 \cdot \mathbf{k} - 1 \cdot (-1) \cdot \mathbf{j} \\ &= -\mathbf{i} - 2\mathbf{j} - 3\mathbf{k} \end{aligned}$$

Let's calculate the product:

$$(2\mathbf{i} - 3\mathbf{j}) \cdot [(i + j - k) \times (3i - k)] = (2\mathbf{i} - 3\mathbf{j}) \cdot (-\mathbf{i} - 2\mathbf{j} - 3\mathbf{k}) = -2 + 6 = 4$$

**Answer: 4**