

Answer on Question #56039 – Math – Analytic Geometry

Question

Let

$$A=i-2j-3k$$

and

$$B=2i+3j+k.$$

Find

$$|A \times B|$$

(v101)

(v191)

(v195)

(v121)

Solution

$$\begin{aligned}\vec{A} \times \vec{B} &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ a_x & a_y & a_z \\ b_x & b_y & b_z \end{vmatrix} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 1 & -2 & -3 \\ 2 & 3 & 1 \end{vmatrix} = \mathbf{i} \begin{vmatrix} -2 & -3 \\ 3 & 1 \end{vmatrix} - \mathbf{j} \begin{vmatrix} 1 & -3 \\ 2 & 1 \end{vmatrix} + \mathbf{k} \begin{vmatrix} 1 & -2 \\ 2 & 3 \end{vmatrix} = \\ &= \mathbf{i}((-2) \cdot 1 - (-3) \cdot 3) - \mathbf{j}(1 \cdot 1 - (-3) \cdot 2) + \mathbf{k}(1 \cdot 3 - (-2) \cdot 2) \\ &= \mathbf{i}(-2 + 9) - \mathbf{j}(1 + 6) + \mathbf{k}(3 + 4) = (7; -7; 7) \\ &|\vec{A} \times \vec{B}| = \sqrt{7^2 + (-7)^2 + 7^2} = \sqrt{147}\end{aligned}$$

Answer: $\sqrt{147}$.