

Vectors **A** and **B** are defined as follows:

$$\mathbf{A} = 3\mathbf{i} + 4\mathbf{j} - \mathbf{k}$$

$$\mathbf{B} = 2\mathbf{i} - \mathbf{j} + 3\mathbf{k}$$

Calculate the magnitude of the cross product of vectors **A** and **B**.

	x	y	z	x	y
A	3	4	-1	3	4
B	2	-1	3	2	-1

$$\mathbf{A} \times \mathbf{B} = i \left[(A_y)(B_z) - (A_z)(B_y) \right] + j \left[(A_z)(B_x) - (A_x)(B_z) \right] \\ + k \left[(A_x)(B_y) - (A_y)(B_x) \right]$$

$$= i \left[\underset{12}{(4)(3)} - \underset{-1}{(-1)(-1)} \right] + j \left[\underset{-2}{(-1)(2)} - \underset{-9}{(3)(3)} \right] + k \left[\underset{-3}{(3)(-1)} - \underset{-8}{(4)(2)} \right]$$

$$= i(11) + j(-11) + k(-11)$$

$$= 11i - 11j - 11k$$

$$\text{Magnitude} = \sqrt{(11)^2 + (-11)^2 + (-11)^2} = \boxed{19}$$

rounded