

Answer on Question #46941, Math, Vector Calculus

Let

$$r_1 = 3i - 2j + k, r_2 = 2i - 4j - 3k, r_3 = -i + 2j + 2k$$

Find $r_2 \cdot (r_1 \times r_3)$

Solution

$$r_2 \cdot (r_1 \times r_3) = \begin{vmatrix} r_{2i} & r_{2j} & r_{2k} \\ r_{1i} & r_{1j} & r_{1k} \\ r_{3i} & r_{3j} & r_{3k} \end{vmatrix}$$

$$r_2 \cdot (r_1 \times r_3) = \begin{vmatrix} 2 & -4 & -3 \\ 3 & -2 & 1 \\ -1 & 2 & 2 \end{vmatrix} =$$

$$\begin{aligned} &= 2 \cdot (-2) \cdot 2 + (-4) \cdot 1 \cdot (-1) + (-3) \cdot 3 \cdot 2 - (-3) \cdot (-2) \cdot (-1) - (-4) \cdot 3 \cdot 2 - 2 \cdot 1 \cdot 2 = \\ &= -8 + 4 - 18 + 6 + 24 - 4 = 4 \end{aligned}$$

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