

Answer on Question #46939 – Math – Vector Calculus

Solve the following

$r_1 = 3i - 2j + k$ $r_2 = 2i - 4j - 3k$ $r_3 = -i + 2j + 2k$ Find $r_1 \cdot r_2$

- 7
- 11
- 3
- 10

Solution:

$$\vec{r}_1 = 3\vec{i} - 2\vec{j} + \vec{k}$$

$$\vec{r}_2 = 2\vec{i} - 4\vec{j} - 3\vec{k}$$

$$\vec{r}_3 = -\vec{i} + 2\vec{j} + 2\vec{k}$$

If the vectors are expressed in terms of unit vectors $i, j,$ and k along the $x, y,$ and z directions, the scalar (or dot) product can also be expressed in this form:

$$\vec{r}_1 \cdot \vec{r}_2 = r_{1x}r_{2x} + r_{1y}r_{2y} + r_{1z}r_{2z} = 3 \cdot 2 + (-2)(-4) + 1(-3) = 6 + 8 - 3 = 11$$

Answer: $\vec{r}_1 \cdot \vec{r}_2 = 11$