

Each problem is worth 5 points. Clear and complete justification is required for full credit.

Let $\mathbf{a} = 3\mathbf{i} - 2\mathbf{k}$, and $\mathbf{b} = -2\mathbf{i} + 5\mathbf{j} - \mathbf{k}$.

1. Find $\mathbf{a} \cdot \mathbf{b}$.

$$a = \langle \overset{a_1}{3}, \overset{a_2}{0}, \overset{a_3}{-2} \rangle$$

$$b = \langle \overset{b_1}{-2}, \overset{b_2}{5}, \overset{b_3}{-1} \rangle$$

Excellent!

$$\begin{aligned} \mathbf{a} \cdot \mathbf{b} &= \langle a_1, a_2, a_3 \rangle \cdot \langle b_1, b_2, b_3 \rangle \\ &= a_1 b_1 + a_2 b_2 + a_3 b_3 \\ &= 3(-2) + (0)5 + (-2)(-1) \\ &= \underline{-6 + 0 + 2} \\ &= \boxed{-4} \end{aligned}$$

2. Find $\mathbf{a} \times \mathbf{b}$.

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 0 & -2 \\ -2 & 5 & -1 \end{vmatrix} = (0\hat{i} + 4\hat{j} + 15\hat{k}) - (-10\hat{i} - 3\hat{j} + 0\hat{k})$$

$$= (10\hat{i} + 7\hat{j} + 15\hat{k})$$

Great

$$= \underline{\langle 10, 7, 15 \rangle}$$