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Find a unit vector perpendicular to both $2\mathbf{i} + 4\mathbf{j} - 3\mathbf{k}$ and $2\mathbf{k} - \mathbf{i}$.

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Find the area of the triangle with vertices (2, 3, 1), (1, –1, 2) and (–1, 1, 3).

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Let $u = -2\mathbf{i} + 3\mathbf{j} + 4\mathbf{k}$, and $v = 3\mathbf{i} - 2\mathbf{j} - \mathbf{k}$, and $w = -\mathbf{i} + 4\mathbf{j} + 2\mathbf{k}$.

[a] Determine if $\mathbf{u} \times \mathbf{v}$ and $\mathbf{v} \times \mathbf{w}$ are orthogonal.

[b] Find $\mathbf{u} \cdot (\mathbf{v} \times \mathbf{w})$.

[c] Find $(\mathbf{w} \times \mathbf{u}) \cdot \mathbf{v}$.

[d] **BONUS**: Use the algebraic properties of the dot and cross products (pages 460 and 828) to prove a relationship between the vector expressions in [b] and [c].

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