hw2

Friday, January 16, 2026 8:37 AM

P0.6 | Verify $\vec{\nabla} \cdot (\vec{\nabla} \times \vec{f}) = 0$.

$$\vec{f} = f_x \hat{x} + f_y \hat{y} + f_z \hat{z}$$

focus on the x-component of the curl

$$(\vec{\nabla} \times \vec{f})_x = \frac{\partial f_z}{\partial y} - \frac{\partial f_y}{\partial z}$$

the divergence of this will be

$$\vec{\nabla} \cdot (\vec{\nabla} \times \vec{f}) = \frac{\partial^2 f_z}{\partial x \partial y} - \frac{\partial^2 f_y}{\partial x \partial z} - \left(\frac{\partial^2 f_z}{\partial y \partial x} - \frac{\partial^2 f_x}{\partial y \partial z} \right) + \frac{\partial^2 f_y}{\partial z \partial x} - \frac{\partial^2 f_x}{\partial z \partial y}$$

so this is equal to zero as are the other terms.