Module 14 Homework Mark Musil

Monday, April 18, 2022 7:04 AM

Name: _____

Problem 1:

The gradient is:

$\vec{\nabla}t = \frac{\partial t}{\partial x}\hat{x} + \frac{\partial t}{\partial y}\hat{u} + \frac{\partial t}{\partial z}\hat{z}$

Find ∇t for: $t = x^2y^3z^4$

$\nabla t = \langle 2xy^3z^4, 3x^2y^2z^4, 4x^2y^3z^3 \rangle$

Problem 2:

The divergence is:

$\vec{\nabla} \cdot \vec{v} = \frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} + \frac{\partial v_z}{\partial z}$

Indicate the function v_x, v_y, v_z and find $\vec{\nabla} \cdot \vec{v}$ for: $\vec{v} = xy\hat{x} + 2yz\hat{y} + 3xz\hat{z}$

$v_x = xy, \; v_y = 2yz, \; v_z = 3xz$

$\vec{\nabla} \cdot \vec{v} = y + 2z + 3x$

Problem 3:

The curl is:

$\vec{\nabla} \times \vec{v} = \left(\frac{\partial v_z}{\partial y} - \frac{\partial v_y}{\partial z}\right)\hat{x} + \left(\frac{\partial v_x}{\partial z} - \frac{\partial v_z}{\partial x}\right)\hat{y} + \left(\frac{\partial v_y}{\partial x} - \frac{\partial v_x}{\partial y}\right)\hat{z}$

Indicate the function v_x, v_y, v_z and find $\vec{\nabla} \times \vec{v}$ for: $\vec{v} = -y\hat{x} + x\hat{y} + 0\hat{z}$

$v_x = -y, \; v_y = x, \; v_z = \emptyset$

$\vec{\nabla} \times \vec{v} = (0 - 0)\hat{x} + (0 - 0)\hat{y} + (1 + 1)\hat{z}$

$\vec{\nabla} \times \vec{v} = 2\hat{z}$