Quiz 8 Calc 3 11/20/2006

1. Find the divergence of the vector field $\mathbf{F}(x,y,z) = \langle -z, y^2, x\rangle$.

$$\nabla \cdot F = \left\langle \frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z} \right\rangle \cdot \langle -z, y^2, x \rangle$$

$$\frac{\partial}{\partial x}(-z) + \frac{\partial}{\partial y}(y^2) + \frac{\partial}{\partial z}(x)$$

$$0 + 2y + 0 = \underline{2y}$$

Good

2. Find the curl of the vector field $\mathbf{F}(x,y,z) = \langle -z, y^2, x\rangle$.

$$\nabla \times F = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ -z & y^2 & x \end{vmatrix} = \left(\frac{\partial}{\partial y}(x)\vec{i} + \frac{\partial}{\partial x}(y^2)\vec{k} + \frac{\partial}{\partial z}(-z)\vec{j} \right) - \left(\frac{\partial}{\partial y}(-z)\vec{k} + \frac{\partial}{\partial z}(y^2)\vec{i} + \frac{\partial}{\partial x}(x)\vec{j} \right)$$

$$= (0-0)\vec{i} + (-1-1)\vec{j} + (0-0)\vec{k}$$

$$= \underline{-2\vec{j}}$$

Great