Quiz 6 **Calculus 3** **11/19/2010**

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

1. Compute the curl of the vector field $\mathbf{F}(x,y,z) = \langle yz, xz, xy \rangle$.

wait $f = xyz$ so curl should $= 0$ Yes!

Curl $= \nabla \times \vec{F}$ $\quad P\ Q\ R$

so

$$\begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ P & Q & R \end{vmatrix} = \vec{i}\left(\frac{\partial R}{\partial y} - \frac{\partial Q}{\partial z}\right) - \vec{j}\left(\frac{\partial R}{\partial x} - \frac{\partial P}{\partial z}\right) + \vec{k}\left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right)$$

$(x - x) = 0 \qquad (y - y) = 0 \qquad (z - z) = 0$

so yes

$\nabla \times \vec{F} = \langle 0, 0, 0 \rangle$ Excellent!

2. Compute the divergence of the vector field $\mathbf{F}(x,y,z) = \langle yz, xz, xy \rangle$.

$$\text{divergence} = \nabla \cdot \vec{F} = \left\langle \frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z} \right\rangle \cdot \langle yz, xz, xy \rangle$$

$$= \frac{\partial yz}{\partial x} + \frac{\partial xz}{\partial y} + \frac{\partial xy}{\partial z}$$

$$= 0 + 0 + 0$$

$$= \boxed{0}$$

Great!