Quiz 5b **Calculus 3** **11/12/2008**

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

Let $\mathbf{A}(x, y, z) = \left\langle \frac{x}{x^2+y^2}, \frac{y}{x^2+y^2}, 0 \right\rangle$.

1. Compute div **A**.

dot product

Great

$$\text{div } A = \frac{(x^2+y^2)(1) - x(2x)}{(x^2+y^2)^2} + \frac{(x^2+y^2)(1) - y(2y)}{(x^2+y^2)^2} + 0$$

$$= \frac{x^2+y^2-2x^2+x^2+y^2-2y^2}{(x^2+y^2)^2} = \frac{2x^2+2y^2-2x^2-2y^2}{(x^2+y^2)^2} = \underline{\underline{0}}$$

2. Compute curl **A**.

cross product

$$\text{curl } A = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ \frac{x}{x^2+y^2} & \frac{y}{x^2+y^2} & 0 \end{vmatrix} = \left(0\vec{i} + 0\vec{j} + \frac{(x^2+y^2)(0) - y(2x)}{(x^2+y^2)^2}\vec{k}\right)$$

$$- \left(0\vec{i} + 0\vec{j} + \frac{(x^2+y^2)0 - x(2y)}{(x^2+y^2)^2}\vec{k}\right)$$

Excellent!

$$= \langle 0, 0, 0 \rangle$$

$$= \underline{\underline{\vec{0}}}$$