

Math 210 (Lesieutre)  
Quiz 11  
April 14, 2017

Name: \_\_\_\_\_

**Problem 1.** Let  $\mathbf{F} = \langle xy, y, \sin(xz) \rangle$ . Compute  $\nabla \times \mathbf{F}$ , the curl of  $\mathbf{F}$ .

The curl is given by

$$\begin{aligned}\nabla \times \mathbf{F} &= \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ f & g & h \end{vmatrix} \\ &= \left( \frac{\partial h}{\partial y} - \frac{\partial g}{\partial z} \right) \mathbf{i} + \left( \frac{\partial f}{\partial z} - \frac{\partial h}{\partial x} \right) \mathbf{j} + \left( \frac{\partial g}{\partial x} - \frac{\partial f}{\partial y} \right) \mathbf{k} \\ &= (0 - 0) \mathbf{i} + (0 - -z \cos(xz)) \mathbf{j} + (0 - x) \mathbf{k} \\ &= (-z \cos(xz)) \mathbf{j} + (-x) \mathbf{k} = \langle 0, -z \cos(xz), -x \rangle\end{aligned}$$