Math 2415

Paper Homework #14

These problems are not to be handed in, but are here to give you some more practice.

1. **16.5, Curl and Divergence:** Compute the divergence and curl of the following vector fields

   (a) $\mathbf{F} = (x + yz)\mathbf{i} + (y + xz)\mathbf{j} + (z + xy)\mathbf{k}$.

   (b) $\mathbf{F} = x\mathbf{i} + y\mathbf{j}$.

   (c) $\mathbf{F} = \frac{x\mathbf{i} + y\mathbf{j} + z\mathbf{k}}{(x^2 + y^2 + z^2)^{3/2}}$

2. Let $\mathbf{F}$ be a vector of the form $\mathbf{F}(x, y, z) = f(x)\mathbf{i} + g(y)\mathbf{j} + h(z)\mathbf{k}$. Show that $\nabla \times \mathbf{F} = \mathbf{0}$.

3. Let $\mathbf{F}$ be a vector of the form $\mathbf{F}(x, y, z) = f(y, z)\mathbf{i} + g(x, z)\mathbf{j} + h(x, y)\mathbf{k}$. Show that $\nabla \cdot \mathbf{F} = 0$.

4. Problem 2 from http://mathquest.carroll.edu/libraries/MVC.student.20.03.pdf

5. Stewart, 16.5 #9, 10