Math 13 Worksheet #14: Curl and divergence

(1) Find the curl and divergence of $\boldsymbol{F}(x, y, z) =< e^x \sin y, e^y \sin z, e^z \sin x >$.

(2) Determine if the vector field $\boldsymbol{F}(x, y, z) =< 1, \sin z, y \cos z >$ is conservative. If it is, find a function f such that $\nabla f = \boldsymbol{F}$.

(3) Determine if the vector field $\boldsymbol{F}(x, y, z) =< 3xy^2z^2, 2x^2yz^2, x^2y^2z >$ is conservative. If it is, find a function f such that $\nabla f = \boldsymbol{F}$.

(4) Show that any vector field of the form $\boldsymbol{F}(x, y, z) = f(y, z)\boldsymbol{i} + g(x, z)\boldsymbol{j} + h(x, y)\boldsymbol{k}$ is incompressible.