

Homework Section 16.5

1. Find both the curl and divergence of the given vector field.

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

b) $\mathbf{F}(x, y, z) = e^x \cos y\mathbf{i} + e^x \sin y\mathbf{j} + z\mathbf{k}$

c) $\mathbf{F}(x, y, z) = \langle -1/x, y/x, z/x \rangle$

2. Determine whether or not the vector field is conservative using curl. If it is conservative, find a potential function, f .

a) $\mathbf{F}(x, y, z) = (y^3z + 2x)\mathbf{i} + (3xy^2z + z)\mathbf{j} + (xy^3 + y)\mathbf{k}$

b) $\mathbf{F}(x, y, z) = xe^{-x}\mathbf{i} - e^{-x}\mathbf{j} + z\mathbf{k}$

c) $\mathbf{F}(x, y, z) = \langle yze^{xy}, xze^{xy}, e^{xz} \rangle$