6-9)

A static force (not changing in time) is conservative if the *curl* of the field is zero:

$$\boldsymbol{\nabla} \times \boldsymbol{F} = 0.$$

You can find the curl in a manner similar to finding cross-products:

$$\begin{matrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ \dfrac{\partial}{\partial x} & \dfrac{\partial}{\partial y} & \dfrac{\partial}{\partial z} \\ F_x & F_y & F_z \end{matrix}$$

Determine if the following force fields are conservative.

a) **F**(**r**) = $Cy^2\boldsymbol{j}$, where C is a negative constant.
b) **F**(**r**) = $Cy^2\boldsymbol{i}$, where C is a negative constant.
c) Sketch the fields to see if you can make a more direct argument to support your result from a and b.