

Quiz 4

1. Test whether the following force is path-independent using $\vec{\nabla} \times \vec{F}$:

$$\vec{F}_{\text{quiz}} = -y\hat{x}. \quad (1)$$

You can use:

$$\vec{\nabla} \times \vec{A} = \hat{x} \left(\frac{\partial}{\partial y} A_z - \frac{\partial}{\partial z} A_y \right) + \hat{y} \left(\frac{\partial}{\partial z} A_x - \frac{\partial}{\partial x} A_z \right) + \hat{z} \left(\frac{\partial}{\partial x} A_y - \frac{\partial}{\partial y} A_x \right) \quad (2)$$

2. Can you define a potential energy associated with \vec{F}_{quiz} ?

3. The potential energy of a particle is given by $U = Axy^2 + B \sin Cz$, where A , B , and C are constants. What is the corresponding force? You can use:

$$\vec{\nabla} f = \frac{\partial f}{\partial x} \hat{x} + \frac{\partial f}{\partial y} \hat{y} + \frac{\partial f}{\partial z} \hat{z} \quad (3)$$