

vecs.exe Exercises for Chapter vecs

Exercise vecs.light

Consider a vector field $F : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ defined in Cartesian coordinates (x, y, z) as _____/20 p.

$$\mathbf{F} = [x^2 - y^2, y^2 - z^2, z^2 - x^2]. \quad (1)$$

- a. Compute the divergence of F .
- b. Compute the curl of F .
- c. Prove that, in a simply connected region of \mathbb{R}^3 , line integrals of F are path-dependent.
- d. Prove that F is not the gradient of a potential (scalar) function (i.e. that it does not have a gradient, as we've called it).

Fourier and orthogonality