

Identifying Gradient Fields and Exact Differentials

1. Compute the curl of the tangential vector field $\mathbf{F} = \left\langle -\frac{y}{r^2}, \frac{x}{r^2} \right\rangle$.
2. Show that \mathbf{F} is not conservative by computing $\int_C \mathbf{F} \cdot d\mathbf{r}$, where C is the unit circle.
3. Why do you think we refer to \mathbf{F} as a “tangential” vector field?
- 4 In polar coordinates, $\theta(x, y) = \tan^{-1} y/x$. Show that $\mathbf{F} = \nabla\theta$.

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