

# Stokes' Theorem

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# Stokes' Theorem Practice Problems

- 1 Use Stokes' Theorem to find  $\oint_C \langle y, -2z, 4x \rangle$  where  $C$  is  $x + 2y + 3z = 1$  in the first octant oriented counterclockwise.

## Challenge Problems

- 1 Let  $I$  be the flux of  $\mathbf{F} = \langle e^y, 2xe^{x^2}, z^2 \rangle$  through the upper hemisphere  $\mathcal{S}$  of the unit sphere.
  - 1 Let  $\mathbf{G} = \langle e^y, 2xe^{x^2}, 0 \rangle$ . Find a vector field  $\mathbf{A}$  such that  $\text{curl}(\mathbf{A}) = \mathbf{G}$ .
  - 2 Use Stokes' Theorem to show  $\iint_{\mathcal{S}} \mathbf{G} \cdot d\mathbf{S} = 0$ .
  - 3 Calculate  $I$ . *Hint:* Use part (2) to show that  $I = \iint_{\mathcal{S}} \langle 0, 0, z^2 \rangle \cdot d\mathbf{S}$ .