## Stokes' Theorem

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November 27, 2012

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## Theorem

Let \$ be a smooth or piecewise smooth oriented surface with a smooth or piecewise smooth boundary curve C. Suppose that \$ has an (oriented) unit normal vector **n** and that C has a parametrization that traverses C in the counterclockwise direction with respect to **n**. If  $\mathbf{F}(x, y, z) = F_1(x, y, z)\mathbf{i} + F_2(x, y, z)\mathbf{j} + F_3(x, y, z)\mathbf{k}$  is a vector field on an open region containing \$, then

$$\int_{C} \mathbf{F}(x, y, z) \cdot d\mathbf{r} = \iint_{S} curl \ \mathbf{F}(x, y, z) \cdot \mathbf{n} \ dS.$$

Methods of Applied Calculus (JMU)