

Lesson 33, §16.4 Green's Theorem

Positive Orientation The **positive orientation** of a simple closed curve C is a single *counterclockwise* traversal of C . Informally, when ever you walk along the boundary your left hand should be pointing the region.

Green's Theorem Let C be a positively oriented, piecewise-smooth, simple closed curve in the plane and let D be the region bounded by C . If P and Q have continuous partial derivative on an open region that contains D , then

$$\int_C P dx + Q dy = \iint_D \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dA$$

equivalently, it can be written as

$$\iint_D \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y} \right) dA = \int_{\partial D} P dx + Q dy$$

Green's Theorem on Area

$$A = \oint_C x dy = - \oint_C y dx = \frac{1}{2} \oint_C x dy - y dx$$