§17.4 GREENS THEOREM

$$\int_C F \cdot dr$$

vector feild

$3\mathbb{R}$

$$\left.\begin{aligned} x &= x(t) \\ y &= y(t) \\ z &= z(t) \end{aligned}\right\}$$ everything is in parameter

$$r(t) = x(t)\vec{i} + y(t)\vec{j} + z(t)\vec{k}$$

$$= \int_C F \cdot dr = \int_{\text{domain of } t} F \cdot r'(t)\, dt$$

$$F(x,y,z) = P(x,y,z)\vec{i} + Q(x,y,z)\vec{j} + R(x,y,z)\vec{k}$$

$$= \int_{\text{domain of } t.} \left(P(x,y,z)\, x'(t) + Q(x,y,z)\, y'(t) + R(x,y,z)\, z'(t)\right) dt$$

$$= \int_C P\,dx + Q\,dy + R\,dz$$

GREEN'S THEOREM: let C be a closed domain in $\mathbb{R}^2$ which encloses a domain is zero.

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

note: the curve C is traced counterclockwise

notation.

$$\oint P\,dx + Q\,dy,$$

Green's Theorem is similiar to the FTC for a double integral C,