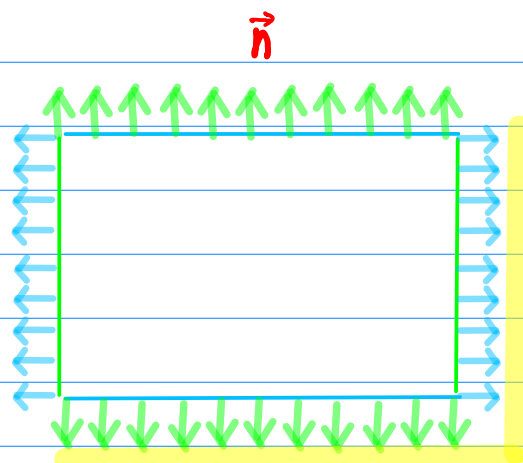
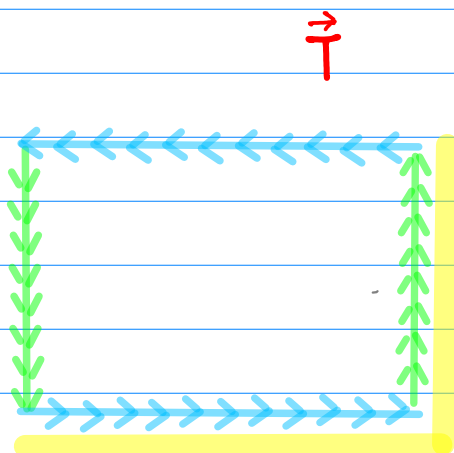


# Complex Curl & Div (H.1)

20160112

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$$\oint_C \vec{F} \cdot \vec{T} ds = \oint u dx + v dy$$

tangent  
vector

$$\oint_C \vec{F} \cdot \vec{n} ds = \oint u dy - v dx$$

normal  
vector

Complex notation

$$f = u + i v$$

$$\overline{f} = u - i v$$

$$z = x + i y$$

$$dz = dx + i dy$$

$$\oint \overline{f(z)} dz = \oint (u - i v)(dx + i dy)$$

$$= \oint u dx + i u dy - i v dx + v dy$$

$$= \left[ \oint u dx + v dy \right] + i \left[ \oint u dy - v dx \right]$$

Circulation

net flux

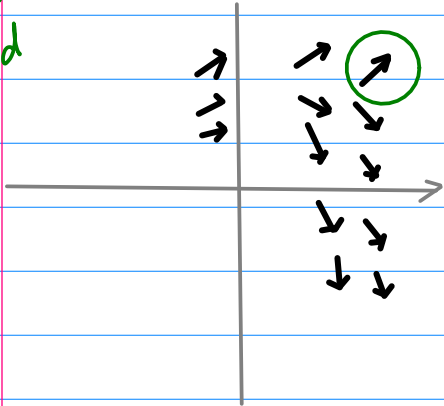
$$\oint_C f \cdot \vec{T} ds$$

$$\oint_C f \cdot \vec{n} ds$$

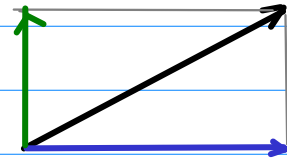
$\mathbb{R}^2$

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

Vector Field

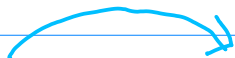


$Q(x,y) \vec{j}$



$P(x,y) \vec{i}$

$(x,y)$



$\vec{F}(x,y)$

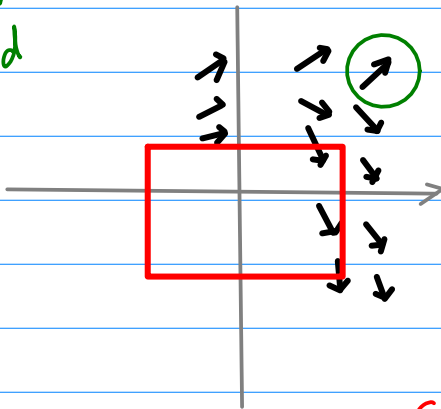
한수값  $\Rightarrow$  Vector

Vector Valued Function

$P(x,y)$  는 vector  $\vec{F}(x,y)$  의  $\vec{i}$  성분 ( $x$ 축방향의 크기)

$Q(x,y)$  는 vector  $\vec{F}(x,y)$  의  $\vec{j}$  성분 ( $y$ 축방향의 크기)

Vector Field

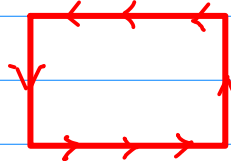


Contour

Contour의

접선 방향 Vector  $\vec{T}$

법선 방향 Vector  $\vec{n}$



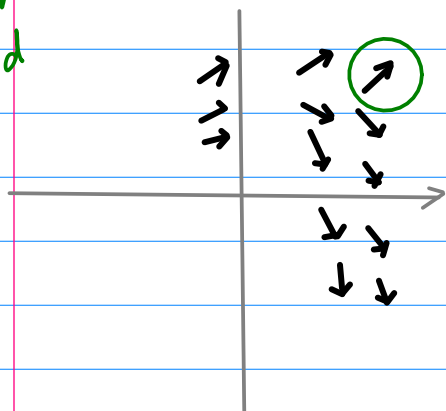
Tangent normal

# Complex notation

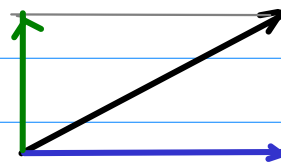
$\mathbb{R}^2$

$$\vec{F}(x, y) = u(x, y) \vec{i} + v(x, y) \vec{j}$$

Vector  
Field



$$v(x, y) \vec{j}$$



$$u(x, y) \vec{i}$$

$\mathbb{R}^2$

Ordered  
pair

a complex number

$$(x, y) \longrightarrow z = x + iy$$

$x, y$ : real

$$\vec{F}(x, y) \longrightarrow f = u + iv$$

$u, v$ : real

$$f(z) = u(x, y) + iv(x, y)$$

