

# Lecture 26

Tuesday, April 13, 2021 1:41 PM

\* Prayer

\* Spiritual thought

\* Answering questions .....

Green's theorem:

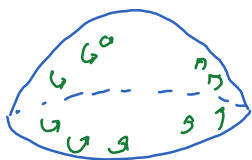
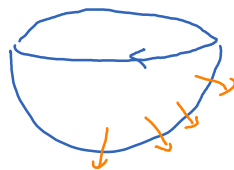
$$\int_C \mathbf{F} \cdot d\mathbf{r} = \iint_D \underbrace{(\mathcal{Q}_x - \mathcal{P}_y)}_{\text{curl } \mathbf{F} \cdot \vec{k}} dA$$

$\uparrow$   
positively oriented

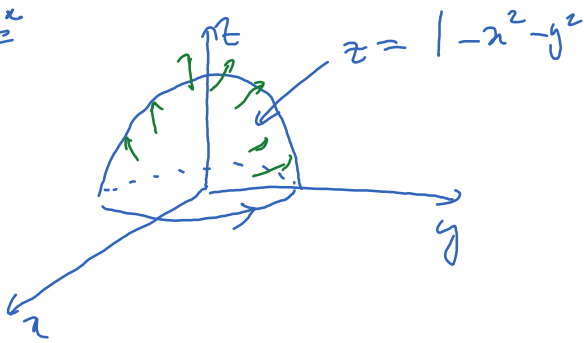
Stoke's theorem

$$\int_C \mathbf{F} \cdot d\mathbf{r} = \iint_S \text{curl } \mathbf{F} \cdot d\vec{\mathcal{S}}$$

$\uparrow$   
positively oriented wrt  $S$   
(the right hand rule)



E<sub>x</sub>



$$\int_S \text{curl } F \cdot d\vec{S} = ?$$

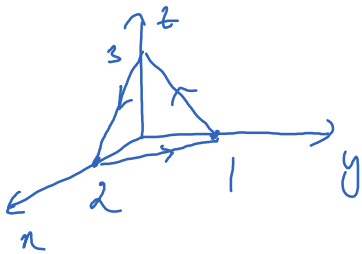
where  $F = \langle x, y, z \rangle$

$$\int_S \text{curl } F \cdot d\vec{S} = \int_C F \cdot dr$$

$$r(t) = \langle \cos t, \sin t, 0 \rangle \rightsquigarrow r'(t) = \langle -\sin t, \cos t, 0 \rangle \left. \vphantom{r(t)} \right\} F \cdot r' = 0$$

$$F = \langle x, y, z \rangle = \langle \cos t, \sin t, 0 \rangle$$

E<sub>x</sub>



$$\int_C F \cdot dr = \int_S \text{curl } F \cdot d\vec{S}$$

$$S: \begin{cases} x = \\ y = \\ z = \end{cases}$$

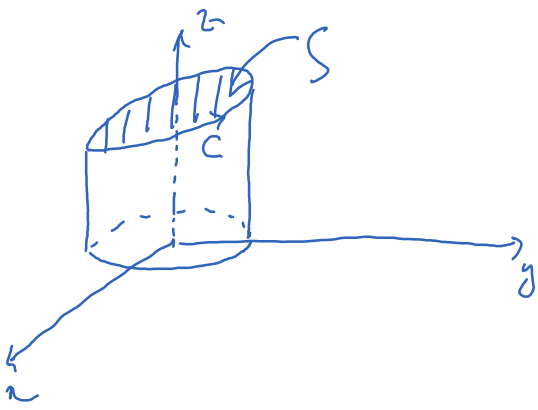
$$\left. \begin{aligned} a_1 &= \langle 2, 0, 0 \rangle - \langle 0, 0, 3 \rangle = \langle 2, 0, -3 \rangle \\ a_2 &= \langle 2, 0, 0 \rangle - \langle 0, 1, 0 \rangle = \langle 2, -1, 0 \rangle \end{aligned} \right\} \begin{aligned} n &= a_1 \times a_2 \\ &= \langle -3, -6, -2 \rangle \end{aligned}$$

normal vector:  $\langle 3, 6, 2 \rangle$

$$3(x-2) + 6y + 2z = 0$$

$$\rightsquigarrow \boxed{3x + 6y + 2z = 6}$$

$\vec{F} =$



$$\int_C \langle 2y, xz, x+y \rangle \cdot dr$$

$\vec{F} =$

