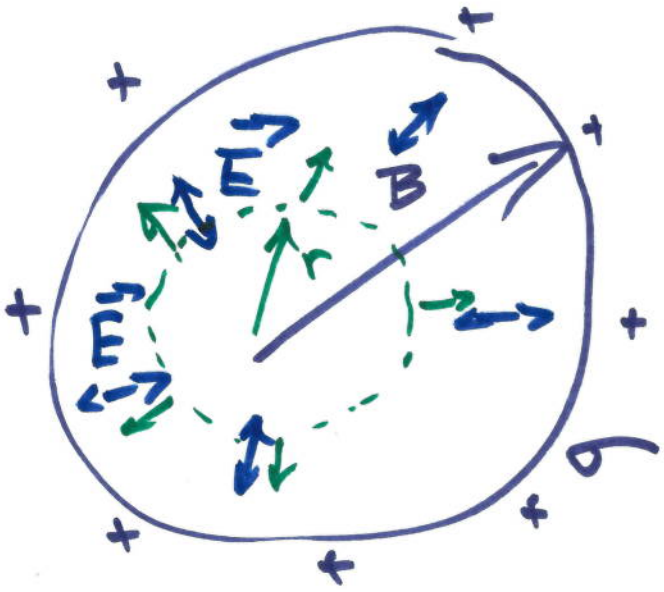
Physics 201 Day 9

Free! Exam 1 review tomorrow
One Night Only!
6-7:30 pm in lab: SIE 2111

Wed: Quiz 2.0 : Gauss' Law.
Friday: In lab: Exam 1.

Practice Gauss' law Quiz

Thin Shell Sphere, radius B, with σ on it. Find E(r) inside (r<B) and outside (r>B) the Shell.



$\sigma = \frac{\text{charge}}{\text{unit area}}$

$\oint \vec{E} \cdot d\vec{a} = \frac{Q_{IN}}{\epsilon_0}$

region I: r<B "the inside"

$Q_{IN} = 0$

$\oint \vec{E} \cdot d\vec{a} = 0$

$\oint E\, da = 0$

$E \oint da = 0$

$E \oint da = 0$

$E\, 4\pi r^2 = 0$

$E = 0$ inside

(II) $r > B$ (outside)

$$\oint \vec{E} \cdot \vec{da} = \frac{Q_{in}}{\epsilon_0}$$

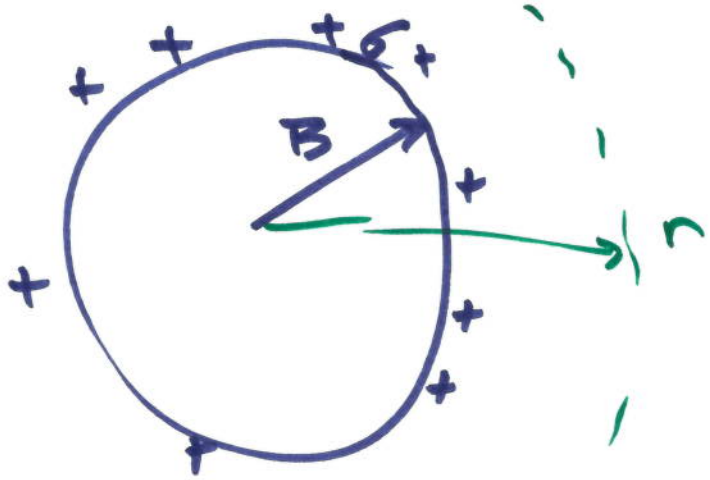
$$\sigma = \frac{Q}{\text{area}}$$

$$E\, 4\pi r^2 = \frac{\sigma\, 4\pi B^2}{\epsilon_0}$$

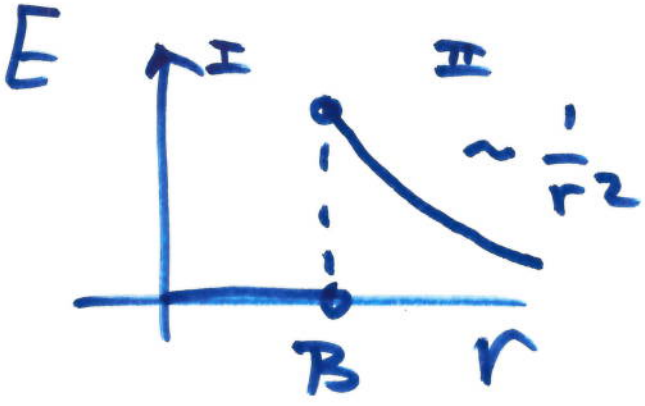
$$\sigma\, 4\pi (B)^2 = Q_{in}$$

flux

Φ_E



$$E = \frac{\sigma B^2}{\epsilon_0 r^2}$$



$$E = \frac{z\rho}{\epsilon_0} \qquad \left(z < \frac{w}{2}, \text{ the inside}\right)$$

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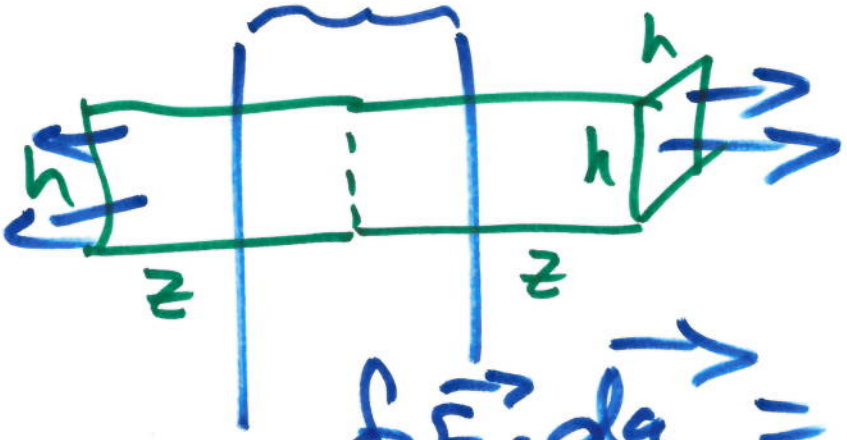
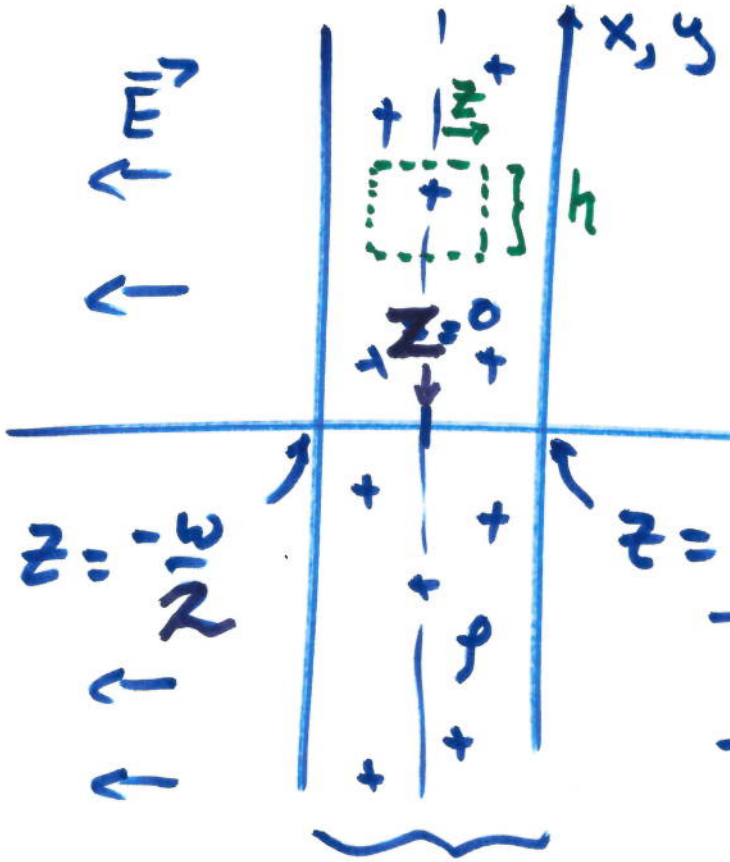
outside $z > \frac{w}{2}$



$$\oint \vec{E} \cdot d\vec{a} = \frac{Q_{in}}{\epsilon_0}$$

$$E\,2h^2 = \frac{\rho h^2 w}{\epsilon_0}$$

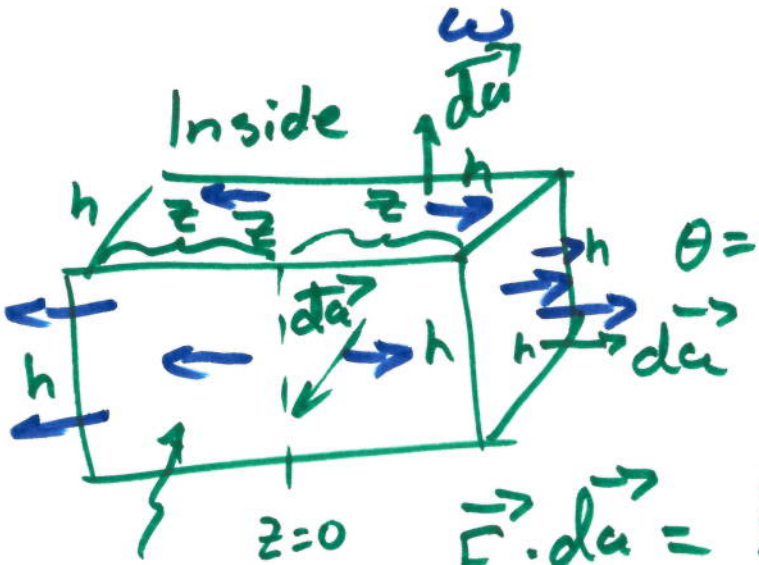
$$\boxed{E = \frac{\rho w}{2\epsilon_0}}$$ indep. of z.



$\rho = \frac{\text{charge}}{\text{volume}}$

$\rightarrow \vec{E}$

find $E(z)$ both inside and outside the Sheet (Plane)?



$\vec{E} \cdot \vec{da} = E\,da\cos\theta$

$\oint \vec{E} \cdot \vec{da} = \frac{Q_{in}}{\epsilon_0}$

$E\,2h^2 = \rho V_{in}/\epsilon_0$

$2Eh^2 = \rho 2zh^2/\epsilon_0$

($2Eh^2$: left and right)