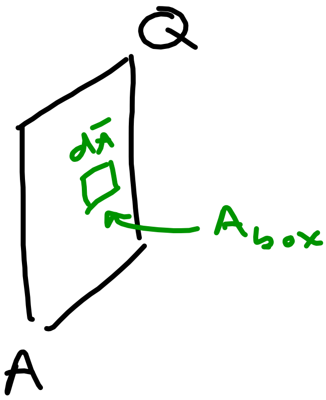
Electric Field of Charged Plate



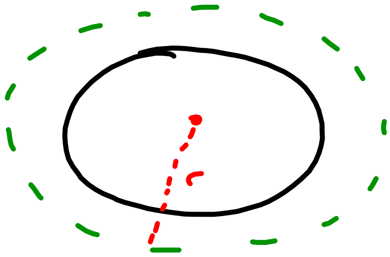
$$\oint \bar{E} \cdot d\bar{A} = \frac{q_{inside}}{\varepsilon_0}$$

$$|\bar{E}_{left}| A_{box} + |\bar{E}_{right}| A_{box} = \frac{q_{inside}}{\varepsilon_0}$$

$$2|\bar{E}|\cancel{A_{box}} = \frac{Q\left(\frac{\cancel{A_{box}}}{A}\right)}{\varepsilon_0}$$

$$|\bar{E}| = \frac{Q/A}{2\varepsilon_0}$$

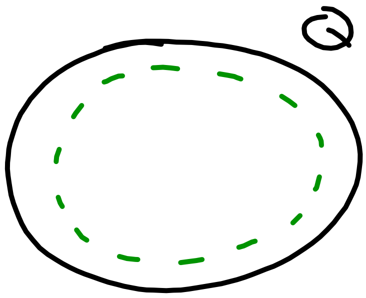
Electric Field of Uniformly Charged Spherical Shell



$$\oint \bar{E} \cdot d\bar{A} = \frac{q_{inside}}{\varepsilon_0}$$

$$|E|\, 4\pi r^2 = \frac{Q}{\varepsilon_0}$$

$$|\bar{E}| = \frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$$

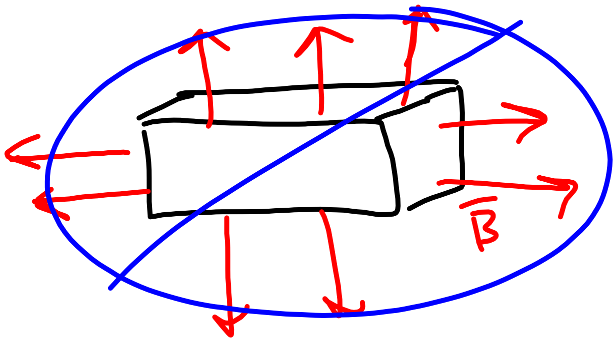


$$\oint \bar{E} \cdot d\bar{A} = \frac{q_{inside}}{\varepsilon_0}$$

$$|E|(4\pi r^2) = \frac{\emptyset}{\varepsilon_0}$$

$$|\bar{E}| = \emptyset$$

"Gauss's Law for Magnetism"



Magnetic monopoles do not exist (as far as we know)

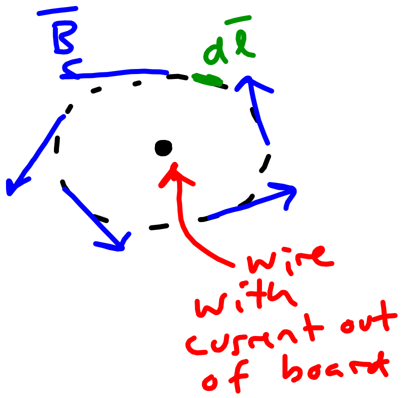
$$\oint \vec{B} \cdot d\vec{A} = \emptyset$$

Ampere's Law

$$B_{wire} = \frac{\mu_0}{4\pi} \frac{2I}{r}$$

$$\oint \bar{B} \cdot d\bar{l} = \frac{\mu_0}{4\pi} \frac{2I}{r} \oint dl$$

circle, so
$l = 2\pi r$

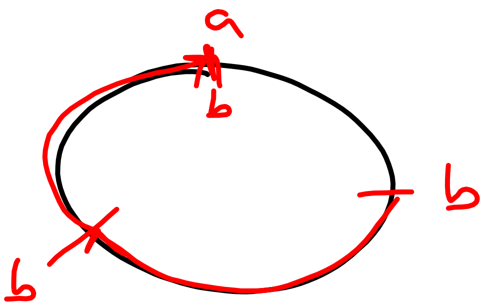


$$\oint \bar{B} \cdot d\bar{l} = \left(\frac{\mu_0}{4\pi} \frac{2I}{r}\right)(2\pi r)$$

$$\oint \bar{B} \cdot d\bar{l} = \mu_0 I$$

Ampere's Law:

$$\oint \bar{B} \cdot d\bar{l} = \mu_0 \sum I_{\text{inside path}}$$



$$\int_a^b \Rightarrow \oint$$