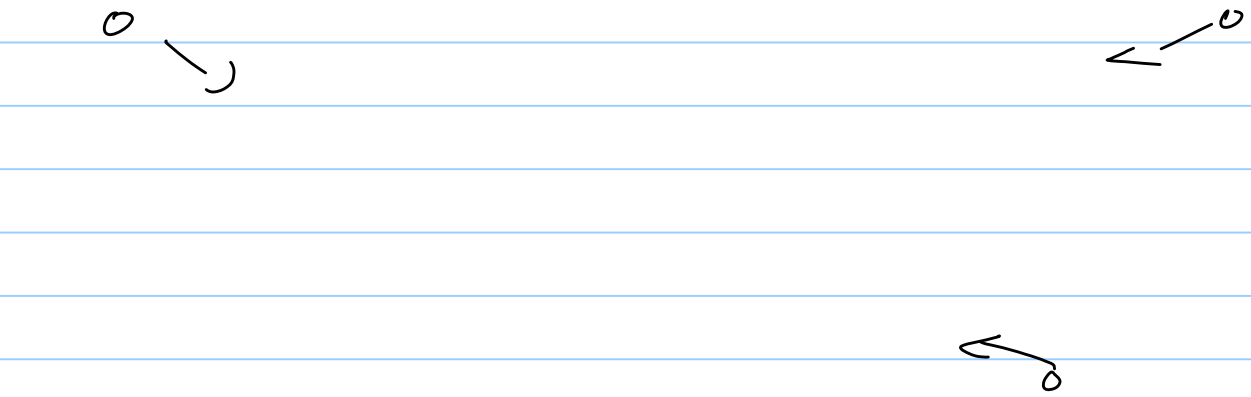
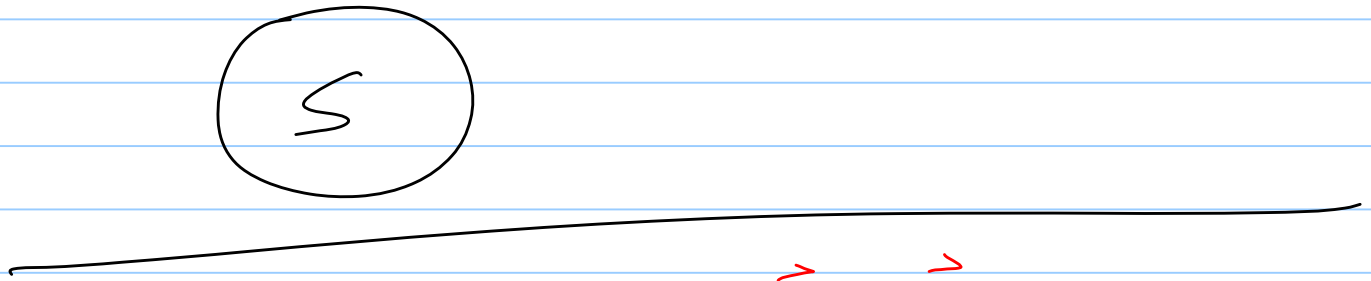
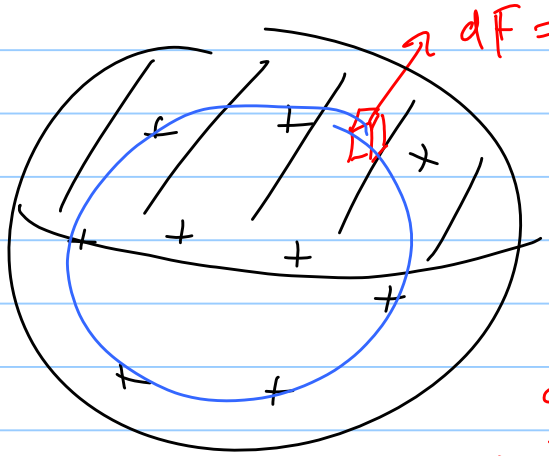
Note Title 1/23/2008

Energy to put the Sun together







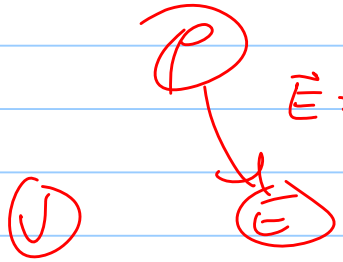
$d\vec{F} = dq\,\vec{E}$ due all other charges from Gauss law

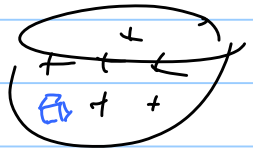
dq

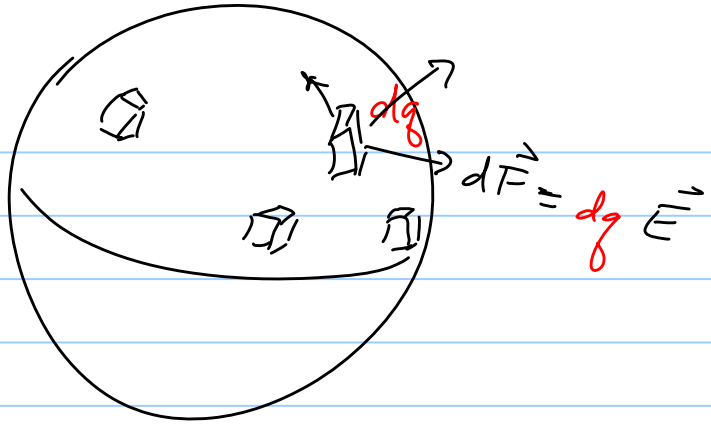
given ρ bottom hemisphere

$\vec{E} = \int \frac{k\,dq}{r^2}\hat{r}$

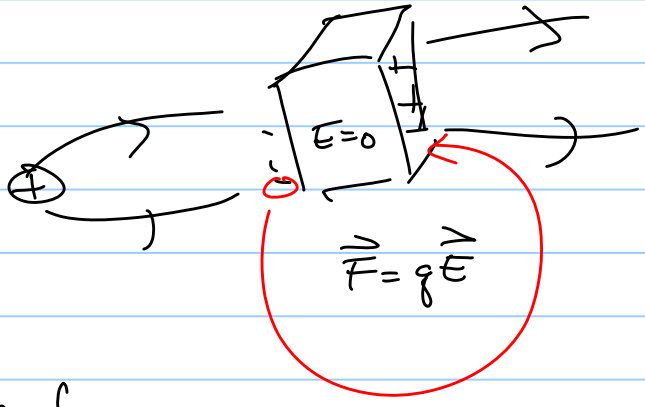
$\vec{E}$ from bottom $\rightarrow dE$





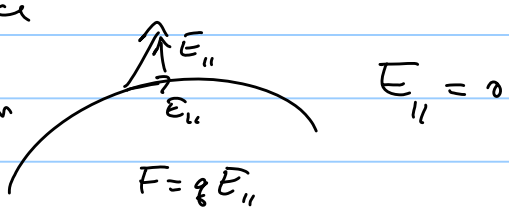


Conductors: electrostatics



(1) $E = 0$ inside

(2) E at surface is $\perp$ to surface

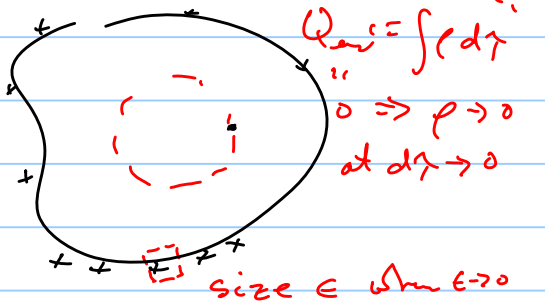


(3) V is constant through conductor

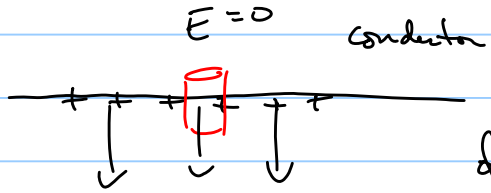
$$\Delta U = -\int_A^B \vec{E}_\parallel \cdot d\vec{r} = V_A - V_B = 0$$

Gauss law:

→ ρ inside conductor



→ $E_{surface}$

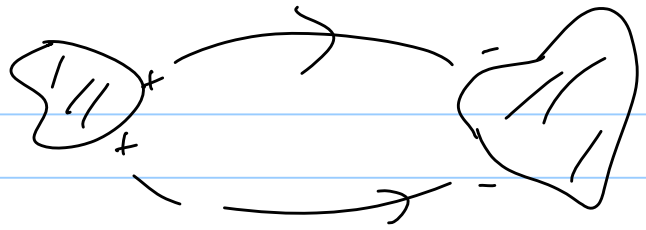


$$\oint \vec{E}\cdot d\vec{a} \to E\pi r^2 = \frac{Q_{enc}}{\epsilon_0}$$

$$= \frac{\sigma \pi r^2}{\epsilon_0}$$

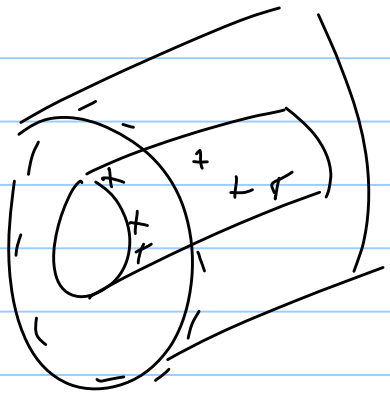
$$= E_{normal} = \frac{\sigma}{\epsilon_0}$$

Capacitors

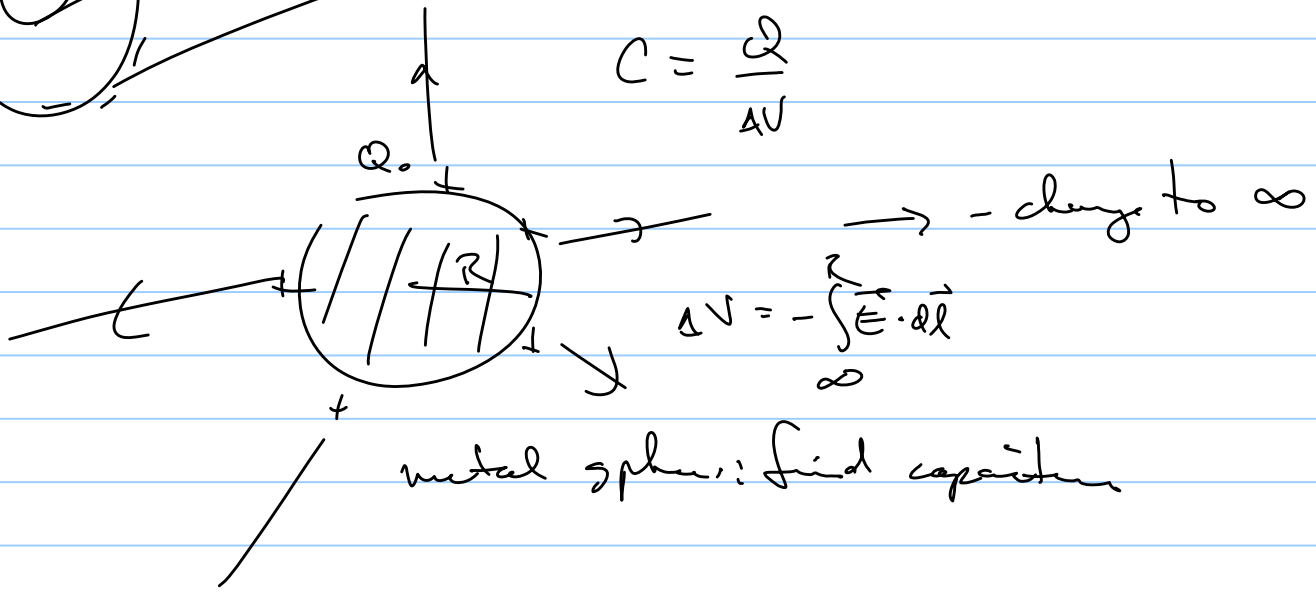


$\Delta V \propto Q$

$\Delta V = \frac{Q}{C}$ ← capacitance depends on geometry



$C = \frac{Q}{\Delta V}$



metal sphere: find capacitance