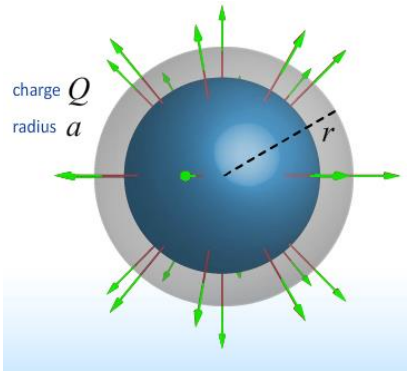
Gauss' Law Symmetries

$$\int \vec{E} \cdot d\vec{A} = \frac{Q_{enc}}{\varepsilon_0}$$

ALWAYS TRUE!

In cases with symmetry can pull E outside and get $E = \dfrac{Q_{enc}}{A\varepsilon_0}$

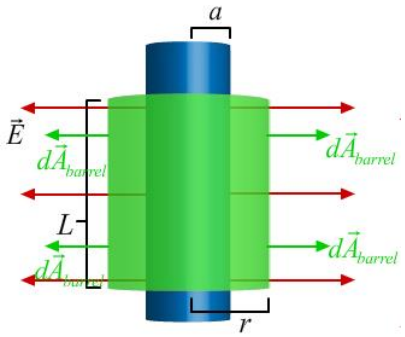
Spherical



$$A = 4\pi r^2$$

$$E = \frac{Q_{enc}}{4\pi r^2 \varepsilon_0}$$

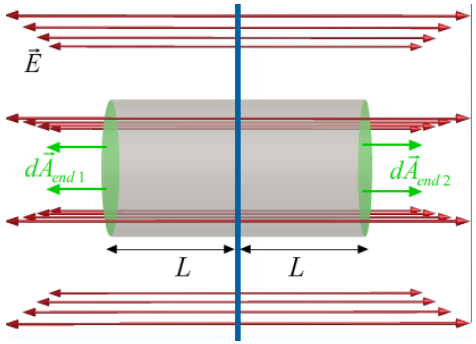
Cylindrical



$$A = 2\pi r L$$

$$E = \frac{\lambda}{2\pi r \varepsilon_0}$$

Planar



$$A = 2\pi r^2$$

$$E = \frac{\sigma}{2\varepsilon_0}$$