

## Physics 23: Possibly Useful Formula

Electric Field:

$$\vec{E} = \frac{q}{4\pi\epsilon_0 r^2} \hat{r}$$

Gauss' Law:

$$\oint \vec{E} \cdot d\vec{A} = \frac{q_{encl}}{\epsilon_0}$$

Electric Potential:

$$V(\vec{r}) = - \int_{\vec{r}_0}^{\vec{r}} \vec{E} \cdot d\vec{s}$$

$$\vec{E} = -\vec{\nabla}V$$

General reference:

$$\frac{1}{4\pi\epsilon_0} \approx 9 \times 10^9 Nm^2/C^2$$

$$\epsilon_0 \approx 9 \times 10^{-12} C^2/Nm^2$$

$$e \approx 1.6 \times 10^{-19} C$$

$$m_e \approx 9 \times 10^{-31} kg$$