PHYS 4A Exam 4 Cheat Sheet (with LaTeX)

$$e = 1.602 \times 10^{-19}\text{C}$$

$$k = 8.99 \times 10^{9}\frac{\text{Nm}^2}{\text{C}^2} = \frac{1}{4\pi\epsilon_0}$$

$$\epsilon_0 = 8.85 \times 10^{-12}\frac{\text{C}^2}{\text{Nm}^2}$$

$$\vec{F} = \frac{kq_1q_2}{r^2}\hat{r} = \frac{kq_1q_2}{r^3}\vec{r}$$

$$\vec{E} = \frac{kq}{r^2}\hat{r} = \frac{kq}{r^3}\vec{r}$$

$$F = qE$$

In a diagram, the direction of an electric field is represented by the direction of its arrows, while the strength of the field is represented by the proxmity of the lines.

$$\lambda = \frac{Q}{r}; \sigma = \frac{Q}{A}; \rho = \frac{Q}{V}$$

$$E = \int dE = \int \frac{k\ dq}{r^3}\vec{r} = \int \frac{k\lambda}{r^3}\vec{r}dr$$

$$\vec{E}_{ring}(z) = \frac{kqz}{(z^2 + R^2)^{3/2}}\hat{k}$$

For a rod of length L, measured at a distance d from the close end from the rod of charge Q.

$$\vec{E}_{rod;axis}(d) = -\frac{kQ}{d(d-L)}\hat{i}$$

$$\vec{E}_{arc} = \frac{k\lambda}{r}\begin{pmatrix} 2\sin(\frac{\theta}{2}) \\ 0 \end{pmatrix}$$

Electric Dipoles

$$\vec{E} = \begin{cases} < 0 \text{ if } -\frac{d}{2} < z < \frac{d}{2} \\ > 0 \text{ otherwise} \end{cases}$$

In an electric field:

$$\vec{\tau} = \vec{p} \times \vec{E}$$

$$U = -\vec{p} \cdot \vec{E}$$

Current

$$I = \frac{dq}{dt}$$