Physics 200 Formula Sheet

$$F = k \frac{q_1 q_2}{r^2}$$

$$k = 8.99 \times 10^{9} \text{ N m}^2/\text{C}^2$$

$$e = 1.60 \times 10^{-19} \text{ C}$$

$$\vec{E} = \frac{\vec{F}}{q_o}$$

$$\vec{E} = k \sum_i \frac{q_i}{r_i^2} \hat{r}$$

$$\vec{E} = k \int \frac{d q}{r^2} \hat{r}$$

$$\phi_E = \int \vec{E} \cdot d\vec{A}$$

$$\int \vec{E} \cdot d\vec{A} = \frac{q_{in}}{\varepsilon_o}$$

$$\varepsilon_o = 8.85 \times 10^{-12} \text{ C}^2 / \text{N m}^2$$

$$\Delta U = - q_o \int_A^B \vec{E} \cdot d s$$

$$\Delta V = \frac{\Delta U}{q_o}$$

$$\Delta V = - \int_A^B \vec{E} \cdot d s$$

$$V = k \frac{q}{r} \quad \text{(for a point charge)}$$

$$U = k \frac{q_1 q_2}{r_{12}} \quad \text{(for two point charges)}$$

$$1 \text{ e V} = 1.6 \times 10^{-19} \text{ J}$$

$$E_x = - \frac{\partial V}{\partial x}$$

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

$$C_{eq} = \sum C_i \quad \text{(parallel)}$$

$$\frac{1}{C_{eq}} = \sum \frac{1}{C_i} \quad \text{(series)}$$

$$U = \frac{Q^2}{2 C}$$

$$u = \frac{\varepsilon_o E^2}{2}$$

$$V = \frac{V_o}{\kappa}$$

$$C = \kappa C_o$$

$$i = \frac{dQ}{dt}$$

$$j = \frac{i}{A}$$

$$\vec{j} = \sigma \vec{E}$$

$$i = \frac{V}{R}$$

$$R = \frac{\rho L}{A}$$

$$R_{eq} = \sum R_i \quad \text{(series)}$$

$$\frac{1}{R_{eq}} = \sum \frac{1}{R_i} \quad \text{(parallel)}$$

$$P = i V$$

$$P = i^2 R$$

$$\sum \Delta V = 0 \quad \text{(around loop)}$$

$$\sum i_{in} = \sum i_{out}$$

$$q(t) = Q_{max} \left[1 - e^{-t / R C}\right] \quad \text{(charging)}$$

$$q(t) = Q_{max} \left[e^{-t / R C}\right] \quad \text{(discharging)}$$