Formula sheet - Phys 272 Exam #2 - April 2, 2009

$$\vec{E} = -\vec{\nabla}V = -\left(\frac{\partial V}{\partial x}, \frac{\partial V}{\partial y}, \frac{\partial V}{\partial z}\right),\ E = -\frac{dV}{dx}, E = -\frac{dV}{dr}$$

$$U = \frac{1}{2}\sum_{i=1}^{N} q_i V_i\ ,\ U = \frac{1}{2}\sum_{i=1}^{N} Q_i V_i$$

$$C = \frac{Q}{V},\ U = \frac{1}{2}\frac{Q^2}{C} = \frac{1}{2}QV = \frac{1}{2}CV^2$$

$$u_E = \frac{1}{2}\varepsilon_0 E^2$$

$$C_{parallel} = C_1 + C_2,\ C_{series} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}}$$

$$E = E_0 / \kappa\ ,\ \varepsilon = \kappa\varepsilon_0$$

$$I = qnv_d A$$

$$R \equiv \frac{V}{I},\ R = \frac{\rho L}{A}$$

$$P = IV = I^2 R = \frac{V^2}{R}$$

$$R_{series} = R_1 + R_2,\ R_{parallel} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$$

$$\tau = RC$$

$$\vec{F}_B = q\vec{v} \times \vec{B}\ ,\ d\vec{F}_B = Id\vec{\ell} \times \vec{B}$$

$$R = \frac{mv}{qB}$$

$$\vec{\mu} = NIA\hat{n}\ ,\ \vec{\tau} = \vec{\mu} \times \vec{B},\ U = -\vec{\mu} \cdot \vec{B}$$

(continued on reverse side)

$$\vec{B} = \frac{\mu_0}{4\pi}\frac{q\vec{v}\times\hat{r}}{r^2},\ d\vec{B} = \frac{\mu_0}{4\pi}\frac{Id\vec{\ell}\times\hat{r}}{r^2}$$

$$\oint_{surface} \vec{B}\cdot\hat{n}dA = 0$$

$$\oint_{curveC} \vec{B}\cdot d\vec{\ell} = \mu_0 I_C$$

$$B = \frac{\mu_0 I}{2\pi r},\ B = \mu_0 nI$$

$$\vec{M} = \frac{d\vec{\mu}}{dV},\ \vec{B} = \vec{B}_{external} + \mu_o\vec{M},\ \vec{B} = \vec{B}_{external}\left(1+\chi_M\right) = K_M\vec{B}_{external}$$