Formula sheet - Phys 272 Exam #3

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

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

$$EMF = \oint_{curve} \vec{E}\cdot d\vec{\ell} = -\frac{d\phi_M}{dt}$$

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

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

$$EMF = -L\frac{dI}{dt}$$

$$EMF = vB\ell$$

$$\phi_M = LI$$

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$$I_{RMS} = \frac{I_0}{\sqrt{2}}, V_{RMS} = \frac{V_0}{\sqrt{2}}$$

$$X_L = \omega L, X_C = \frac{1}{\omega C}$$

$$\omega_0 = \frac{1}{\sqrt{LC}}$$

$$c = \frac{1}{\sqrt{\varepsilon_0\mu_0}}$$

$$\oint_{surface} \vec{E}\cdot\hat{n}dA = \frac{Q_{enclosed}}{\varepsilon_0}$$

$$\oint_{curve} \vec{E}\cdot d\vec{\ell} = -\frac{d\phi_M}{dt} = -\frac{d}{dt}\int_{surface} \vec{B}\cdot\hat{n}dA$$

$$\oint_{curve} \vec{B}\cdot d\vec{\ell} = \mu_0(I + I_d) \quad I_d = \varepsilon_0\frac{d\phi_E}{dt} = \frac{d}{dt}\int_{surface} \vec{E}\cdot\hat{n}dA$$

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$$\frac{\partial^2 \vec{E}}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 \vec{E}}{\partial t^2}, \qquad \frac{\partial^2 \vec{B}}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 \vec{B}}{\partial t^2}$$

$$\vec{S} = \frac{1}{\mu_0}\vec{E} \times \vec{B} \quad E = cB \quad \vec{E} \cdot \vec{B} = 0, \quad \vec{E} \cdot \vec{S} = 0, \quad \vec{B} \cdot \vec{S} = 0$$

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$$n = \frac{c}{v}, \quad n_1 \sin\theta_1 = n_2 \sin\theta_2, \quad \theta_1 = \theta_1', \quad \sin\theta_C = \frac{n_2}{n_1}$$

$$\frac{1}{s} + \frac{1}{s'} = \frac{1}{f}$$

$$f = \frac{R}{2}$$