Exam 2 Formulas

$$\vec{F} = q\vec{E}$$

$$\vec{F} = \frac{kq_1q_2}{r_{12}^2}\hat{r}_{12} = \frac{1}{4\pi\epsilon_0}\frac{q_1q_2}{r_{12}^2}\hat{r}_{12}$$

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

$$\oint \vec{E}\cdot d\vec{A} = \frac{Q_{enclosed}}{\epsilon_0}$$

$$\vec{E} = \int_{vol} \frac{k\,dQ}{r^2}\hat{r}$$

V = work/charge

$$V_{\substack{point\\charge}} = \frac{kQ}{r}$$

$$V = \int_{vol} \frac{k\,dQ}{r}$$

$$E_s = -dV/ds$$

$$V = IR$$

$$Q = CV$$

$$U = \tfrac{1}{2}CV^2$$

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

$|e| = 1.6\times10^{-19}$ coulombs

$$k = 8.99\times10^{9}\ \frac{Nm^2}{C^2}$$

$$\epsilon_0 = 8.85\times10^{-12}\ C^2/Nm^2$$

$$\mu_0 = 4\pi\times10^{-7}\ \frac{Tm}{A}$$

$$E = E_0/\kappa$$

$$C = \kappa C_0$$

$$Q(t) = C\mathcal{E}(1-e^{-t/RC})$$

$$Q(t) = Q_0e^{-t/RC}$$

$$\left.\begin{aligned} R_{eq} &= \Sigma r_i \\ 1/C_{eq} &= \Sigma \tfrac{1}{C_i}\end{aligned}\right]\ \text{For series geometry}$$

$$\vec{F} = q\vec{v}\times\vec{B} = l\,\vec{i}\times\vec{B}$$

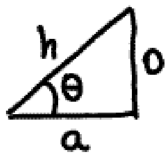
$$\vec{\mu} = nIA$$

$$\vec{\tau} = \vec{\mu}\times\vec{B}$$

$$B_{solenoid} = \mu_0 n I$$

$$\vec{B} = \frac{\mu_0}{4\pi}\int \frac{i\,d\vec{l}\times\hat{r}}{r^2}$$

$$\int_{curve} \vec{B}\cdot d\vec{l} = \mu_0 I_{encl}$$



$\sin\theta = \frac{o}{h} \quad \cos\theta = \frac{a}{h}$

$\tan\theta = o/a$

Sphere: $A = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3$

cylinder: $A = 2\pi r L + 2\pi r^2$

$V = \pi r^2 L$

$a_c = \frac{mv^2}{r}$

$S = r\theta$

$KE = \frac{1}{2}mv^2$

$PE_{spring} = \frac{1}{2}kx^2$

$V = V_0 + at$

$x = x_0 + V_0 t + \frac{1}{2}at^2$

$V^2 = V_0^2 + 2a(x - x_0)$

$x = x_0 + \frac{1}{2}(v + v_0)t$

$\int u^n du = \frac{u^{n+1}}{n+1}$

$\int \frac{du}{u} = \ln|u|$

$\int e^u du = e^u$

$\int \frac{x\,dx}{(x^2+a^2)^{1/2}} = \sqrt{x^2+a^2}$