Exam 2 Review
Covered: Ch 18, 19, 20
Lightly: 20.11, 20.13
Not at all: 18.9, 18.10, 19.6, 20.5, 20.9, 20.12, 20.14

Format:
Same as Exam 1. There may be one or two longer problems (such as on the other Exam 2 review posted), but the problem solving technique of last semester will not be required.

Must know:
Especially: Anything that you saw in Lab + Lecture + Homework
Anything the book presents in a beige box, Ex. Conservation of Charge
What each of the equations on the Equation Sheet means
Lab: Principles, Techniques, and Math employed in Lab

What questions or topics would you like me to go over?

I have compiled sample test problems that we can go over.

This is a closed book, closed notes exam. Calculators are permitted. Provide your own equation sheet with no words on it. Point assignments are noted throughout the exam. Partial credit is awarded *when work is shown.*

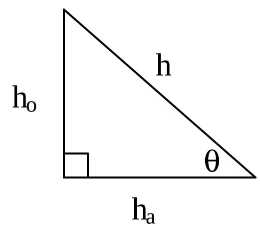
Useful Mathematical Relations

$(\sin(q))^2 + (\cos(q))^2 = 1$, $\sin(2q) = 2\sin(q)\cos(q)$

For small angles: $\sin(q) \approx q$, $\cos(q) \approx 1 - \frac{q^2}{2}$

For circles: $C = 2pR$, $A = pR^2$ For Spheres: $A = 4pR^2$, $V = \frac{4}{3}pR^3$

If $Ax^2 + Bx + C = 0$, then $x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$



$h = \sqrt{h_a^2 + h_o^2}$

$\cos q = \frac{h_a}{h}$

$\sin q = \frac{h_o}{h}$

$\tan q = \frac{h_a}{h_o}$

$q = \tan^{-1}\left(\frac{h_a}{h_o}\right)$

Physical Relations

$\vec{v}_{ave} = \frac{\Delta \vec{r}}{\Delta t}$ $\vec{a}_{ave} = \frac{\Delta \vec{v}}{\Delta t}$ $\vec{F}_{E\to 1} = q_1 \vec{E}(r_1)$ $\vec{F}_{1\to 2} = k_C \frac{q_1 q_2}{r_{1\to 2}^2}\hat{r}_{1\to 2}$

$|E| = \left|\frac{\Delta V}{\Delta s}\right|$ $\Delta P.E._{E,1} = q_1 \Delta V$ $W_{1\to 2} = -\left(k_C \frac{q_1 q_2}{r_{1\to 2,f}} - k_C \frac{q_1 q_2}{r_{1\to 2,i}}\right)$

$\Delta V_1 = k_C \frac{q_1}{r_{1\to ,f}} - k_C \frac{q_1}{r_{1\to ,i}}$ $\Delta P.E. = \frac{1}{2}C(\Delta V)^2$ $W_{net} = -\Delta P.E._{net} = \Delta K.E.$

$q = C\Delta V$ $C = \frac{ke_o A}{d}$ $k = \frac{E_o}{E}$ $\vec{I} = \frac{\Delta q}{\Delta t}\hat{v}$

$I = \frac{|\Delta V|}{R}$ $R = r\frac{L}{A}$ $R_{equivalent} = R_1 + R_2 + \ldots$ $\frac{1}{R_{equivalent}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$

$P_{1\to 2} = \frac{W_{1\to 2}}{\Delta t}$ $P = I\Delta V$

Useful Constants

1 mile = 5280 ft, g = 9.8 m/s^2 = 32 ft/s^2, k_c = $8.99\times 10^9\ N\cdot m^2/C^2$, e = 1.60×10-^{19}C, ε_o = 8.85×10^{-12} $C^2/(N\cdot m^2)$