PHY 842 ASSIGNMENT #1

* READING ASSIGNMENT
  WILCOX AND THRON, CHAPTER 1

* PROBLEM ASSIGNMENT (hand in anonymously)
  The Student Survey

* PROBLEM ASSIGNMENT (not anonymous)
  Problem 1: dimensional analysis and Gaussian units

Dimensional Analysis, from Wikipedia

" Physical quantities can be expressed in terms of combinations of five basic dimensions. These are mass (M), length (L), time (T), electric current (I), and temperature (Q). These five dimensions have been chosen as being basic because they are easy to measure in experiments.

Dimensions aren't the same as units. For example, the physical quantity, speed, may be measured in units of meters per second, or miles per hour, or feet per second, etc. But regardless of the units used, speed is always a length divided a time, so we say that the dimensions of speed are length divided by time, or simply L/T.

Similarly, the dimensions of area are L^2 since area can always be calculated as a length times a length. For example, although the area of a circle is conventionally written as pi r^2, we could write it as pi x r x r ; i.e. the dimensions are L x L = L^2. "

Problem 1.
Use Gaussian units; the force between charges is F = q1 q2 / r^2 .
(a) Fill in the Table below. (Hand in this page with the table filled in.)
(b) Show that the equation div **E** = 4 pi rho has the correct dimensions.
(c) Show that the equation curl **B** = (4 pi /c) **J** has the correct dimensions.

quantity	dimensions ***(not units)***	Gaussian unit (name)	Gaussian unit in base units
length	L	cm	
time	T	sec	
mass	M	g	
force		dyne	
energy		erg	
electric charge		Fr	
electric field E		statV/cm	
displacement field D		?	
magnetic field B		G	
magnetic field H		Oe	