Problem 1 - answers

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	**cm**
time	T	sec	**sec**
mass	M	g	**g**
force	**$M L T^{-2}$**	dyne	**$g\ cm\ sec^{-2}$**
energy	**$M L^2 T^{-2}$**	erg	**$g\ cm^2\ sec^{-2}$**
electric charge	**$M^{1/2} L^{3/2} T^{-1}$**	Fr	**$g^{1/2}\ cm^{3/2}\ sec^{-1}$**
electric field E	**$M^{1/2} L^{-1/2} T^{-1}$**	statV/cm	**$g^{1/2}\ cm^{-1/2}\ sec^{-1}$**
displacement field D	**$M^{1/2} L^{-1/2} T^{-1}$**	?	**$g^{1/2}\ cm^{-1/2}\ sec^{-1}$**
magnetic field B	**$M^{1/2} L^{-1/2} T^{-1}$**	G	**$g^{1/2}\ cm^{-1/2}\ sec^{-1}$**
magnetic field H	**$M^{1/2} L^{-1/2} T^{-1}$**	Oe	**$g^{1/2}\ cm^{-1/2}\ sec^{-1}$**

(b) div E and rho have the same units: $M^{1/2} L^{-3/2} T^{-1}$.
(c) curl B and J/c have the same units: $M^{1/2} L^{-3/2} T^{-1}$.