Possibly Useful Information for Exam 1

Electron rest mass = $9.1 \times 10^{-31}\ kg$
Proton rest mass = $1.67 \times 10^{-27}\ kg$
Charge on an electron = -1.6 $\times 10^{-19}\ C$
Proportionality constant k in Coulomb's Law = $9.0 \times 10^{9}\ Nm^2/C^2$
Permittivity of free space $\epsilon_0 = 8.9 \times 10^{-12}\ C^2/N\ m^2$

Possibly Useful Formulae

You should be able to interpret the meanings of various symbols below. Ask me if anything is not clear.

$$\mathbf{a} \cdot \mathbf{b} = |\ \mathbf{a}\ |\ |\ \mathbf{b}\ |\ cos\ (\theta) \tag{1}$$

$$\Phi = \int_S \mathbf{E} \cdot\ \hat{\mathbf{n}}\ dS \tag{2}$$

$$V_B - V_A = \ -\int_A^B \mathbf{E} \cdot d\mathbf{l} \tag{3}$$

$$E_x = -\frac{\partial V}{\partial x}, \quad E_y = -\frac{\partial V}{\partial y}, \quad E_z = -\frac{\partial V}{\partial z}, \tag{4}$$

$$\mathbf{E} = k \int \frac{dq\ \hat{\mathbf{r}}}{r^2} \ \ or \ \ \mathbf{E} = k \sum_i \frac{q_i\ \hat{\mathbf{r}}_\mathbf{i}}{r_i^2} \tag{5}$$

$$V = k \int \frac{dq}{r} \ \ or \ \ V = k \sum_i \frac{q_i}{r_i} \tag{6}$$

$$|\ \mathbf{E}\ | = \frac{\sigma}{\epsilon_0} \quad (near\ \ a\ \ conductor) \tag{7}$$

Kinematic Equations

$$v_f = v_i + a\ t \tag{8}$$

$$d = v_i\ t + \frac{a\ t^2}{2} \tag{9}$$

$$v_f^2 = v_i^2 + 2\ a\ d \tag{10}$$