PHYSICS 2B QUIZ 1 WINTER QUARTER 2010
PROF. HIRSCH JANUARY 11, 2010

Formulas:

$\sin 30^\circ = \cos 60^\circ = 1/2, \quad \cos 30^\circ = \sin 60^\circ = \sqrt{3}/2, \quad \sin 45^\circ = \cos 45^\circ = \sqrt{2}/2$

$F = k\frac{q_1 q_2}{r^2}$ Coulomb's law ; $k = 9\times 10^9 \mathrm{N\cdot m^2/C^2}$; $\vec{F}_{12} = \frac{kq_1 q_2}{|\vec{r}_2 - \vec{r}_1|^3}(\vec{r}_2 - \vec{r}_1)$

Electric field due to charge q at distance r: $\vec{E} = \frac{kq}{r^2}\hat{r}$; Force on charge Q: $\vec{F} = Q\vec{E}$

Electric field of dipole, along dipole axis: $E = \frac{2kp}{x^3}$ (p=qd)

Electric field of dipole, along direction perpendicular to dipole axis: $E = \frac{kp}{y^3}$

Energy of and torque on dipole in E-field: $U = -\vec{p}\cdot\vec{E}$, $\vec{\tau} = \vec{p}\times\vec{E}$

Linear, surface, volume charge density : $dq = \lambda\, ds$, $dq = \sigma\, dA$, $dq = \rho\, dV$

Electric field of infinite : line of charge : $E = \frac{2k\lambda}{r}$; sheet of charge : $E = 2\pi k\sigma$