Answers Test 1 2008

1) $$H = \sqrt{\frac{q_1 q_2 \sin\theta}{4\pi\varepsilon_0 mg}}$$

2) $$E_y = \frac{1}{4\pi\varepsilon_0}\left[\frac{Q_2}{H^2} + \frac{Q_1}{(b-a)H}\left(\frac{b}{(b^2+H^2)^{1/2}} - \frac{a}{(a^2+H^2)^{1/2}}\right)\right]$$

3) $$V(0,c) - V(c,0) = \frac{(\alpha-\beta)c^3}{3}$$

$$V(x,y) = -\frac{\alpha x^3}{3} - \frac{\beta y^3}{3} + C$$

$$E_x = -\frac{\partial V(x,y)}{\partial x} = \alpha x^2$$

$$E_y = -\frac{\partial V(x,y)}{\partial y} = \beta y^2$$

4) a) $$\Phi_{side} = ba^4$$

$$\Phi_{top} = \frac{ca^3}{2}$$

b) $$\Phi = \frac{1}{4\pi\varepsilon_0} q\Omega_0$$