Answers Exam 1 2015

1. $q_2 = q_1 \dfrac{a^3}{(a^2+b^2)^{3/2}}$

$q_3 = q_1 \dfrac{b^3}{(a^2+b^2)^{3/2}}$

2. $q = -\dfrac{2Q}{\pi R^2}$

3. $V = \displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{4\pi\varepsilon_0} \frac{Q}{\pi\sqrt{(R\cos\theta + a)^2 + R^2\sin^2\theta}}\, d\theta$

$V = \displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{4\pi\varepsilon_0} \frac{Q}{\pi R}\, d\theta = \frac{1}{4\pi\varepsilon_0} \frac{Q}{\pi R} \pi = \frac{Q}{4\pi\varepsilon_0 R}$

4. $V(2R) - V(\infty) = \dfrac{1}{160} \dfrac{cQ}{R^5}$

$\Phi = \dfrac{4\pi c Q}{R^4}$