**Gauss' Law Practice Self-graded Quiz**
**ECEN 3400, Fall 2013**
Zoya Popovic

*For all problems, sketch the problem and label all relevant quantities and axes. It is also good practice to state the units of all the quantities.*

1. Find the expression for the electric field vector everywhere inside and outside of a coaxial cable filled with dielectric with relative permittivity $\varepsilon_r$. The radius of the inner conductor is *a*, the inside radius of the outer conductor is *b*, and the outside radius of the outer conductor is *c*.
2. Find the expression for the electric field vector in a parallel-plate capacitor filled with a dielectric of permittivity $\varepsilon_r$. The plates of the capacitor are rectangles of sides A and B, and the separation between them is *d*.
3. Find the expression for the electric field vector between the conductors of a two-wire line, in the plane of the two parallel wires. The wires have equal radii *a* and their separation is *d*.
4. Find the voltage between the plates of the parallel-plate capacitor from Problem 2.
5. Find the voltage between the conductors of a coaxial cable from Problem 1.
6. Find the potential at some point in the field of a charged sphere. The sphere is made of metal and has a radius *R*. It is charged with a total charge *Q*.

*Can you do this problem quickly, in one line?*

7. Find the potential at point A in the field of the point charges shown in Figure 7. The point A is midway between the –Q and Q charges on the line joining them.

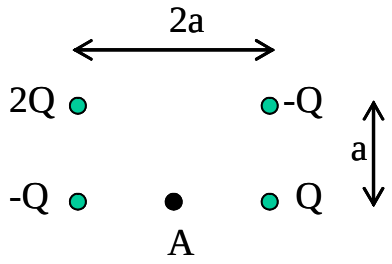


Figure 7