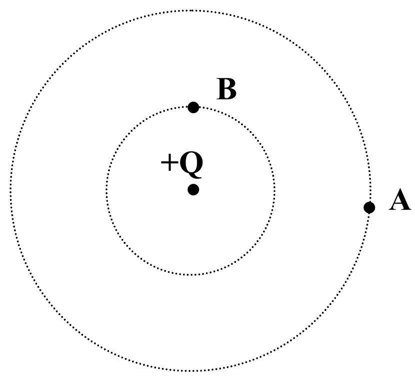
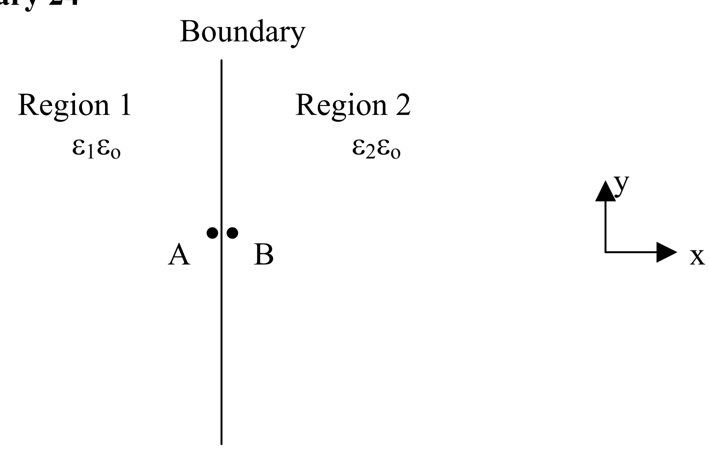
Preparation Assignments:

Due Thursday, February 20



In the above figure, a point charge of size +Q exists at r = 0. Determine the potential (voltage) difference between point A (at r = a) and point B (at r = b). Draw the path that you use to move from point A to point B when performing your calculation. Justify any simplifications.

Due Monday, February 24



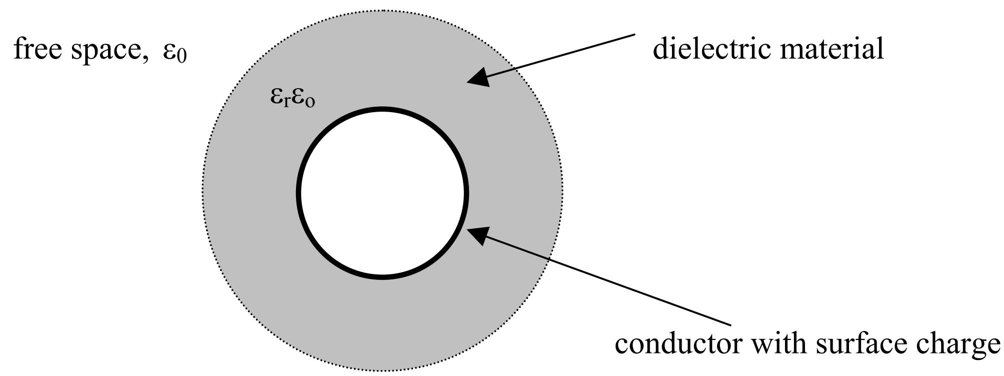
In the above figure, point A is just on the left side of the boundary and point B is just on the right side of the boundary.

If the electric field at A is $\vec{E} = 5\hat{y}$ [V/m], and there is no charge on the boundary, what is the electric field, $\vec{E}$, at point B? What is the displacement field, $\vec{D}$, at point B?

If the displacement field at A is $D = 5\hat{x}$ [C/m^2], and there is no charge on the boundary, what is the displacement field, $\vec{D}$, at point B? What is the electric field, $\vec{E}$, at point B?

If the displacement field at A is $D = 5\hat{x}$ [C/m^2], and the surface charge on the boundary is $\rho_s = 10$ [C/m^2], what is the displacement field, $\vec{D}$, at point B? What is the electric field, $\vec{E}$, at point B?

Due Wednesday, February 26 (Tuesday, 25)



A spherical conductor with radius, *a*, has a surface charge density, $\rho_s = \rho_{sa}$ [C/m^2]. The conductor is inside a dielectric material with an outer radius, *b*. Free space is in the region $b < r$. Determine the electric field, $\vec{E}$, everywhere.

Due Thursday, February 27

In the above figure, we place a thin spherical conducting shell at $r = b$. There is dielectric material between the two conductors. What is the voltage difference between the two conductors? What is the total charge on the inner conductor? What is the capacitance of these two conductors?