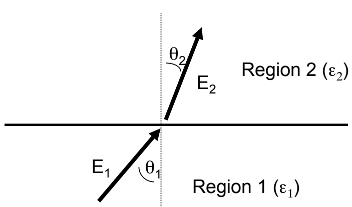
4.10
a You have a straight boundary between two linear dielectric materials (ε_r has one value above, another below, the boundary)
There are no free charges in the regions considered.
What MUST be continuous across the b'ndary?
i) E(parallel) ii) E(perpendicular)
iii) D(parallel) iv) D(perpendicular)

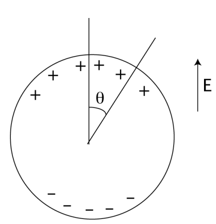
A) i and iii B) ii and iv
C) i and ii D) iii and iv
E) Some other combination!

Two different dielectrics meet at a boundary.
The E field in each region near the boundary is shown.
There are no free charges in the region shown.
What can we conclude about $\tan(\theta_1)/\tan(\theta_2)$?



A) Done with I
B) Not yet…

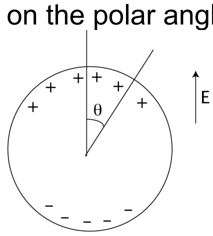
4.2
a You put a conducting sphere in a uniform E-field. How does the surface charge depend on the polar angle (θ)?



a) Uniform + on top half, uniform – on bottom
b) $\cos(\theta)$
c) $\sin(\theta)$
d) Nothing simple, it yields an infinite series of cos's with coefficients.

4.2 b

Now what if the sphere is a dielectric? How do you expect the bound surface charge to depend on the polar angle (θ)?



a) Uniform + on top half, uniform – on bottom

b) $\cos(\theta)$

c) Nothing simple, it yields an infinite series of cos's with coefficients.

4.10 b

You have a boundary between two linear dielectric materials (ε_r has one value above, another below, the boundary) There are no free charges in the regions considered. Which formula will voltage satisfy at the boundary?

A) $V\big|_{out} - V\big|_{in} = 0$

B) $V\big|_{out} - V\big|_{in} = \frac{-\sigma_{tot}}{\varepsilon_0}$

C) $\varepsilon_{out} V\big|_{out} - \varepsilon_{in} V\big|_{in} = 0$

D) $\varepsilon_{out} V\big|_{out} - \varepsilon_{in} V\big|_{in} = -\frac{\sigma_{tot}}{\varepsilon_0}$

E) None of these, or MORE than one...

4.10

You have a boundary between two linear dielectric materials (ε_r has one value above, another below, the boundary) There are no free charges in the regions considered. Which formula will the voltage satisfy at the boundary?

A) $\frac{\partial V}{\partial n}\bigg|_{out} - \frac{\partial V}{\partial n}\bigg|_{in} = \frac{-\sigma_{free}}{\varepsilon_0}$

B) $\frac{\partial V}{\partial n}\bigg|_{out} - \frac{\partial V}{\partial n}\bigg|_{in} = \frac{-\sigma_{tot}}{\varepsilon_0}$

C) $\varepsilon_{out}\frac{\partial V}{\partial n}\bigg|_{out} - \varepsilon_{in}\frac{\partial V}{\partial n}\bigg|_{in} = -\sigma_{free} = 0$

D) $\varepsilon_{out}\frac{\partial V}{\partial n}\bigg|_{out} - \varepsilon_{in}\frac{\partial V}{\partial n}\bigg|_{in} = -\sigma_{bound}$

E) None of these, or MORE than one...

4.11 We argued that C goes UP by a factor of ε_r if you fill a capacitor with dielectric. What happens to the stored energy of a capacitor if it's filled with a dielectric?

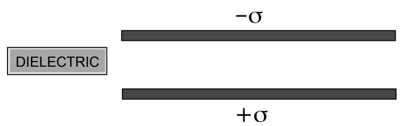
A) It goes up

B) It goes down

C) It is unchanged

D)The answer depends on what else is "held fixed" (V? Q?)

4.12b If we push this dielectric inside the *isolated* capacitor, will it be drawn into the capacitor or repelled?



A. It gets sucked into the capacitor

B. It gets pushed out from the capacitor

C. I just don't know.