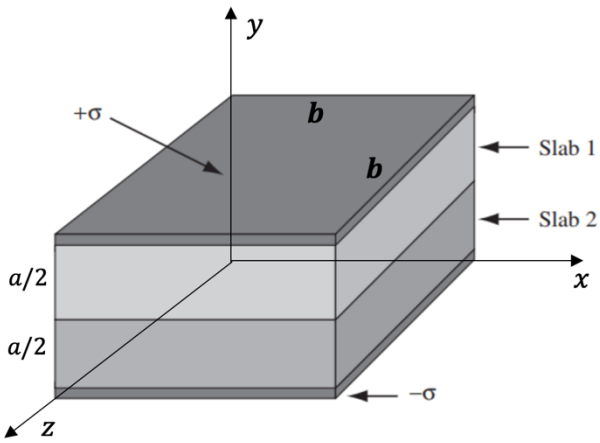
	YTÜ - Fen-Edebiyat Fakültesi FİZİK Bölümü			NOT TABLOSU		
				1. S	2. S	TOPLAM
Adı Soyadı						
Öğrenci Numarası		Grup No	1			
Bölümü			Sınav Tarihi	24.08.2021 12:00-14:00		
Dersin Adı	Classical Electromagnetic Theory 1 Quiz4		Sınav Süresi	100 dak.	Sınav Yeri	
Dersi veren Öğretim Üyesinin Adı Soyadı	Çetin TAŞSEVEN		İmza			

YÖK nun 2547 sayılı Kanunun *Öğrenci Disiplin Yönetmeliğinin* 9. Maddesi olan *"Sınavlarda kopya yapmak ve yaptırmak veya buna teşebbüs etmek"* fiili işleyenler bir veya iki yarıyıl uzaklaştırma cezası alırlar.

You must *show all* of *your work explicitly* and *clearly*, and must explain *your* reasoning to get full credit.

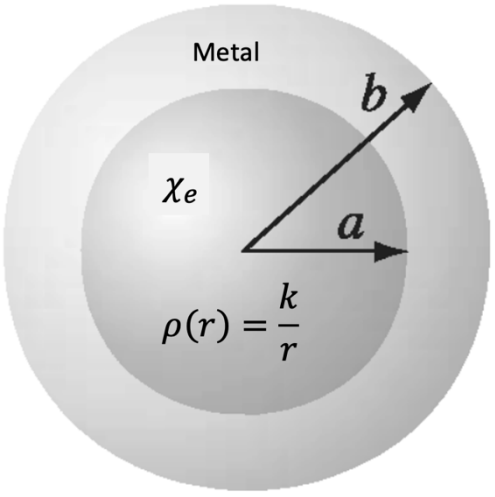
QUESTIONS

Q1. A) (50/100) The space between the plates of a parallel-plate capacitor is filled with two slabs of dielectric material. Each slab has thickness $a/2$, so the total distance between the plates a. Slab I has a polarization of $\vec{\mathcal{P}}_I = k_1\hat{y}$, and slab II has polarization of $\vec{\mathcal{P}}_{II} = k_2(y - \frac{a}{2})\hat{y}$. The capacitor has square plates of side length b and uniform charge density of σ. **Express your answers in terms of given quantities.**



a) Find the surface and volume bound charge densities for slab I and slab 2.
b) Find total bound charge.
c) Find the electric displacement vector $\vec{D}$ in slab I and slab II.
d) Find the electric field vector $\vec{E}$ in slab I and slab II.
e) Find the potential difference between the plates
f) Find the capacitance of the capacitor.

Q2. (50/100) A spherical linear dielectric material of radius a and susceptibility of χ_e has nonuniform charge density of $\rho(r) = \frac{k}{r}$. The dielectric material surrounded by a metal sphere of inner radius a and outer radius b. **Express your answers in terms of given quantities.**



a) Find the inner and outer surface charge densities of the conductors.
b) Find the electric displacement vector $\vec{D}$ at $r \le a$, $a \le r \le b$ and $b \le r$.
c) Find the electric field vector $\vec{E}$ at $r \le a$, $a \le r \le b$ and $b \le r$.
d) Find the surface and volume bound charge densities.
e) Find the energy of the system using $W = \frac{1}{2}\int \vec{D}.\vec{E}\, d\tau$