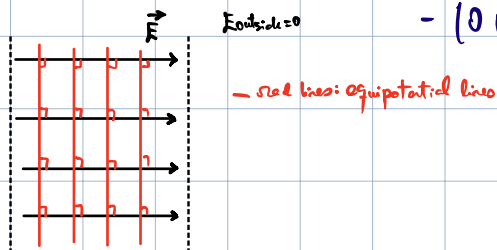


Problem 3

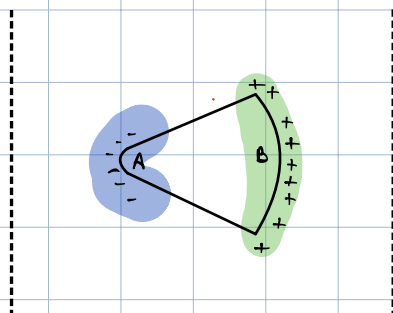
(a)



- (2 points) if they draw the red lines.

- (0 points) otherwise

(b)

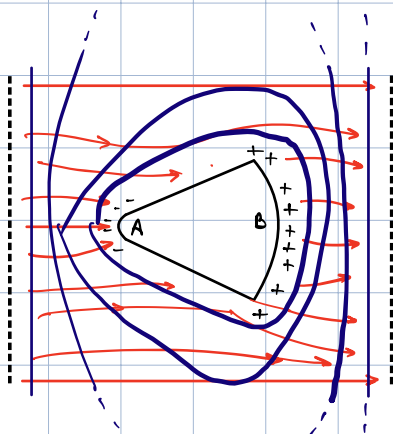


- (2 points) the charge distribution is shown in the figure

- (1 point) Some attempt

- (0 points) Nothing / incorrect

(c)



(4 points)

$E_{outside} = 0$

- **Correct figure**

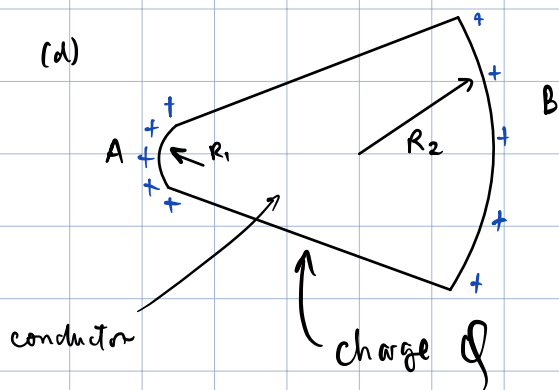
They should say that the equipotential lines are parallel to the plates and they have the form of the conductor (near the conductor)

- (1 points) Some attempt.

⤴ Not a random attempt

- (0 points) Nothing

(d)



(4 points)

- **Correct** (specifying what is highlighted in red)

- (2 points) - Same attempt

- (0 points) - Incorrect

$R_2 \gg R_1$

the electric potential $V_A = V_B$
Since the object is a conductor.

(6 points)

(e) the charge is not uniformly distributed. -(6 points) Correct

As considering they have the same potential $\rightarrow \frac{q_A}{4\pi\epsilon_0 R_1} = \frac{q_B}{4\pi\epsilon_0 R_2}$

$$\rightarrow \frac{\sigma_A \pi R_1^2}{R_1} = \frac{\sigma_B \pi R_2^2}{R_2} \rightarrow \boxed{\frac{\sigma_A}{\sigma_B} = \frac{R_2}{R_1}}$$

\uparrow find

-(2 points) Some attempt

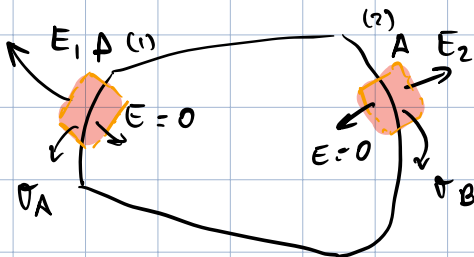
As this, for example

$$\text{if } R_1 \ll R_2 \rightarrow \sigma_A \gg \sigma_B$$

-(10 points) Nothing / Incorrect.

(f)

-(5 points) Correct



$$\frac{E_1}{E_2} = \frac{\sigma_A}{\sigma_B}$$

Applying the Gauss law for (1) and (2):

$$\ast (1) \quad E_1 A_1 = \frac{\sigma_A A_1}{\epsilon_0} \rightarrow E_1 = \frac{\sigma_A}{\epsilon_0}$$

$$\ast (2) \quad E_2 A_2 = \frac{\sigma_B A_2}{\epsilon_0} \rightarrow E_2 = \frac{\sigma_B}{\epsilon_0}$$

$$\boxed{\frac{E_1}{E_2} = \frac{R_2}{R_1}} \quad \text{find}$$

with this they get the full credit

-(2 points) some attempt

With some result like this

$$E_1 \gg E_2 \quad (\sigma_A \gg \sigma_B)$$

they get a partial credits

- (0 points) Incorrect / Nothing

Comment: [For grading, if there is a some attempt for each problem, or incorrect [d] or [e] or [f] and some work for the others : 6 points

If there is a better attempt and [d] is correct you should receive : 10 points]