Set #4 - for Thurs Oct. 30

Read

HR&K, Vol. 2	Ch. 28
Purcell	Ch. 3, Sec. 3.1 – 3.5
	Ch. 10, Sec.10.2 – 10.3
Feynman Vol. 2	Ch. 6, 8, 10

Solve

From HR&K

Ch. 28 Exercise 47, Problems 7, 11, 12

From Purcell

Ch. 2 Problems 2.18, 2.4, 2.19, 2.29

Ch. 3 Problems 3.4

Ch. 10 Problems 10.20, 10.34

Problem 1. Charge Q is located at distance a from the surface of an infinite conducting plane. Calculate charge density induced on the surface of the plane by the charge.

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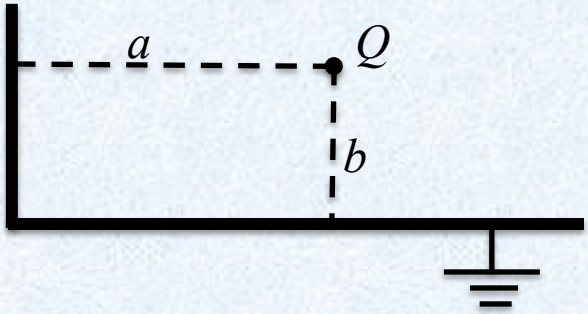
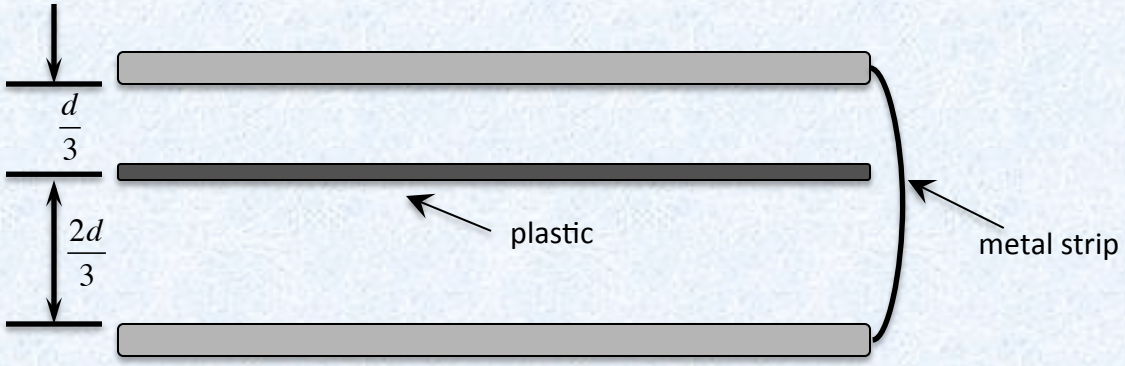
Problem 2. Use the method of images to find the force on a charge Q located at distances a and b from the semi-infinite conducting plates at right angles to each other.



Problem 3. Two large flat metal plates are held parallel to each other and separated by a distance d. They are connected together at their edge by a metal strip. A thin plastic sheet carrying a surface charge σ per unit area is placed between the plates at a distance $d/3$ from the upper plate. Call $\boldsymbol{E}_1$ and $\boldsymbol{E}_2$ the electric field near the upper plate and lower plates, respectively. What are $\boldsymbol{E}_1$and $\boldsymbol{E}_2$?



Problem 4 (Extra Credit). Find the electric potential ~~as a function~~ of ~~distance away from~~ a circular sheet of electric dipoles on the axis of the sheet. Assume that there are n small dipoles per unit area and that each dipole has dipole moment $\boldsymbol{p}$ and is pointing normal to the surface. Radius of the sheet is R. Express your answer as a function of distance from the center of the sheet. For the second pass discuss the value of the potential close and far from the sheet.

Good Luck, Dr. B