

Problem Set #4

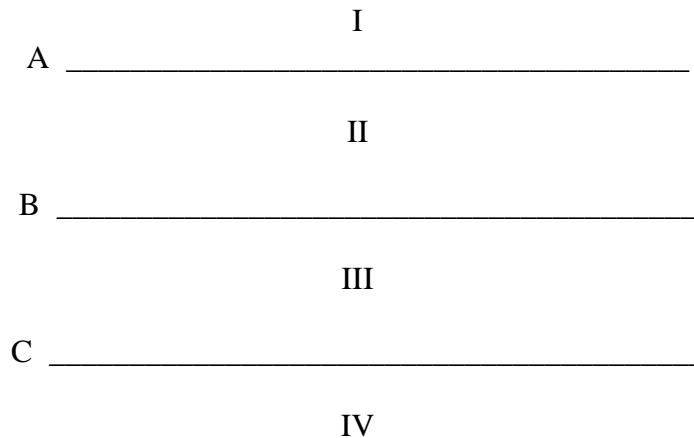
Due Wednesday, January 31, 2001

All problems are from *Physics*, by Halliday, Resnick, and Krane.

Gauss' Law:

- Chapter 29, Problem 9.
- (a) Use Gauss' Law to determine the \mathbf{E} field due to an infinite plane sheet of surface charge, of surface density \mathbf{s} .

(b) Consider three infinite plane charged sheets A, B, and C. The sheets are parallel, as shown in cross section below. On each there is a surface charge of uniform density: $-4 \times 10^{-6} \text{ C/m}^2$ on A, $7 \times 10^{-6} \text{ C/m}^2$ on B, $-3 \times 10^{-6} \text{ C/m}^2$ on C. Describe the electric field \mathbf{E} of this system in regions I, II, III, and IV, as shown below. (Express your result in terms of $\mathbf{s}_0 = 1 \times 10^{-6} \text{ C/m}^2$ and ϵ_0 .)



3. Chapter 29, Problem 29.
4. Chapter 29, Problem 32.
5. A positive point charge q is placed at the center of a spherical conducting shell of inner radius a and outer radius b .
 - (a) Determine the electric field in the three regions $r < a$, $a < r < b$, $b < r$.
 - (b) Determine the density of electric charge that appears on the conductor.
6. Chapter 29, Problem 44.