

ECE 09.303 Fall 2018
Homework 3
Chapter 3/21 – Gauss's Law

1.

Charges $+2q$ and $-q$ are near each other. Sketch some field lines for this charge distribution, using eight lines for a charge of magnitude q .

2.

The net charge shown in Fig. 1 is $+Q$. Identify each of the charges A , B , and C shown.

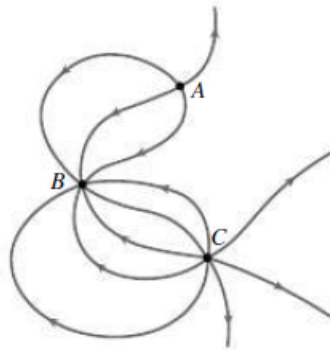


FIGURE 1

3.

A point charge of $-2Q$ is at the center of a spherical shell of radius R carrying charge Q spread uniformly over its surface. Find the electric field at (a) $r = \frac{1}{2}R$ and (b) $r = 2R$. (c) How would your answers change if the charge on the shell were doubled?

4.

A charged slab extends infinitely in two dimensions and has thickness d in the third dimension, as shown in Fig. 2. The slab carries a uniform volume charge density ρ . Find expressions for the electric field (a) inside and (b) outside the slab, as functions of the distance x from the center plane. (Although the infinite slab is impossible, your answer is a good approximation to the field of a finite slab whose width is much greater than its thickness.)

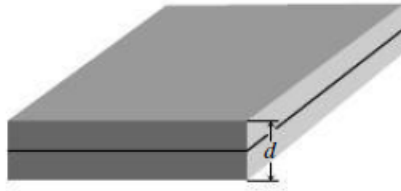


FIGURE 2