

# PHYS-505: ELECTROMAGNETIC THEORY I

## HOMEWORK I

Due 14.03.2014

- Q1: Find the electric field inside and outside
- a spherical shell of radius  $R$ , which carries a uniform surface charge density  $\sigma$ ,
  - a uniformly charged sphere (charge density  $\rho$ ).
- Q2: Find the net force that the southern hemisphere of a uniformly charged sphere exerts on the northern hemisphere. Express your answer in terms of the radius  $R$  and the total charge  $Q$ .
- Q3: A charge is placed at a distance  $b$  along the bisector of the vertex of a bent infinite grounded plane conductor as shown in Figure 1. Find the force on the charge  $q$ .
- Q4: A line charge  $\lambda$  is placed inside a grounded, conducting cylinder parallel to the axis of the cylinder, say at a distance  $R$  from the axis. Determine the potential inside the cylinder.

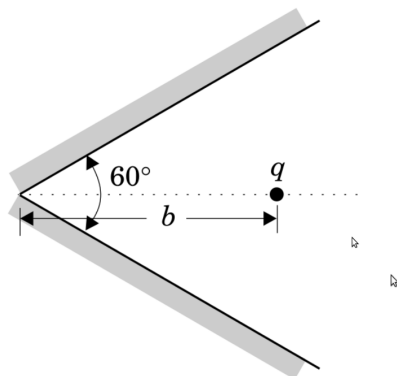


Figure 1: