

**PH4210 HW5****DUE: Wednesday Nov. 16 (or 26), 2007**

1. Pollack & Stump 5.10 parts (a), (c), (d)
  
2. Consider the Dirichlet B.C. example of two hemispheres, the top at  $V_0$  and bottom at  $-V_0$  (in class and in Pollack & Stump example 3 in Ch. 5) as described in equation 5.60.
  - a. Derive eqn. 5.67 for the surface charge density.
  - b. Integrate eqn. 5.67 to find the total charge  $Q$  on the upper hemisphere and then an expression for the capacitance  $C$ .
  
3. Consider again the Neumann B.C. example in Pollack & Stump Ch. 5 example 4. Derive eqn. 5.71.
  
4. Example 9 of Pollack & Stump Ch. 3 gives the potential on the axis of symmetry of a uniformly charged disk of radius  $a$  and charge density  $\sigma$ .
  - a. Expand  $V(z)$  for  $z > a$ . Use this result to find  $V(r,\theta)$  for  $r > a$  in terms of Legendre polynomials.
  - b. Expand  $V(z)$  for  $z < a$ . Use this result to find  $V(r,\theta)$  for  $r < a$  in terms of Legendre polynomials.
  - c. What is going on for  $r = a$ ?