Problem Set #7

1) Problem 3.11

2) Problem 3.50

3) Problem 3.41

4) Problem 3.19

5) Two hemispheres

Consider a spherical conducting shell (radius R) which is divided into two hemispheres at the equator by a thin insulating ring. A potential V_0 is applied to one hemisphere, while a potential $-V_0$ is applied to the other.

a) Write down the boundary condition for the potential in this electrostatic system.

b) Calculate the potential <u>inside</u> the sphere by expanding the potential in powers of the radial variable r. Calculate the first two non-zero terms explicitly.

c) Calculate the potential <u>outside</u> the sphere by expanding the potential in powers of the radial variable r. Calculate the first two non-zero terms explicitly.

d) Determine the dipole moment vector and quadrupole moment term for this electrostatic system.