A spherical surface of radius $b$ has charge $q$ uniformly distributed over a spherical "cap" defined by $\theta \leq \alpha$. A concentric grounded, conducting sphere has radius $a < b$.

(a) Is the surface of radius $b$ a conductor? Why or why not?

(b) Find the potential for $r > a$ as an expansion in Legendre polynomials.

(c) Find the charge density and the total charge induced on the surface of the conducting sphere.

(d) Plot the potential along the polar axis in the case $\alpha = \pi/2$, $b = 2a$. 