1. Read Jackson chapter 2. Did you read all the pages?

2. A point charge q sits a distance h above an infinite grounded xy-plane on the z-axis. Find the surface charge density $\sigma(x, y)$ induced on the plane. Explicitly integrate the surface charge density and show that the total accumulated charge on the plane is $-q$.

3. A metal sphere of radius R carries a total charge Q. Find the net force that the southern hemisphere exerts on the northern hemisphere. (Zero is not the correct answer.)

4. An inverted hemispherical bowl of radius R carries a uniform surface charge density σ. Find the potential difference between the north pole and the center.

Bonus

1. Calculate (do not look up) the solid angle that the Moon subtends if you stand on the surface of the Earth. Do this in steradians and degrees squared $(°^2)$.

2. A sphere of radius R is covered in a surface dipole moment density $D\hat{r}$ where D is a constant magnitude. Find the electrostatic potential (voltage) scalar field everywhere and plot it. Find the electrostatic vector field $\vec{E}(\vec{r})$ everywhere and plot it.