From Griffiths: 2.32, 2.34, 2.38, 2.43, 2.49, 2.50, 2.58, 3.3, 3.7, 3.8, 3.13

1. A charge of $+Q$ is uniformly spread over a sphere of radius a centered at the origin. There is another charge of $-Q$ spread over a sphere of radius a a distance b away $(b > 2a)$ on the x axis. Determine the work that must be done moving a charge q from the center of the second charge to the center of the first.

2. Two concentric conducting sphere with radii $a < b$ have net charges Q_a and Q_b, respectively. The inner sphere is grounded; that is the potential of that sphere is 0 and the potential is 0 at infinity. Find the charge Q_b in terms of Q_a.

3. A capacitor is made of two concentric, conducting spherical shells. Initially, the inner shell, of radius a, is grounded and the outer shell, of radius b, is at potential V.

   (a) What is the capacitance of this system?

   (b) Then the inner shell is removed. What is the inner shell is ungrounded and the shells are connected by a wire. What is the final potential of the shells?