Problem 1: Consider a **conducting** sphere of radius R, charged to +Q. [20 points]

Calculate electric field (magnitude and direction) for
(a) r>R

$$\frac{1}{4\pi\varepsilon_0}\frac{Q}{r^2}$$

(b) r<R

$$0$$

Calculate voltage (assuming V=0 at r=infinity) for
(a) r>R

$$\frac{1}{4\pi\varepsilon_0}\frac{Q}{r}$$

(b) r<R

$$\frac{1}{4\pi\varepsilon_0}\frac{Q}{R}$$

Problem 2: Calculate the capacitance of a spherical capacitor, which is composed of two spheres (one inside another), with inner radius a and outer radius b. [16 points]

$$4\pi\varepsilon_0 \frac{ab}{(b-a)} = C$$

$$\Delta V = \frac{1}{4\pi\varepsilon_0}\left(\frac{Q}{a} - \frac{Q}{b}\right)$$

$$\Delta V = \frac{1}{4\pi\varepsilon_0} Q \left(\frac{b-a}{ab}\right)$$

$$V = \frac{Q}{C}$$

$$\boxed{C = 4\pi\varepsilon_0 \frac{ab}{b-a}}$$