SECOND MIDTERM

SHOW ALL WORK!!!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

Use the conversion constants and data given on the front page.

Given two conducting spheres of radius \( R_1 \) and \( R_2 \). A total charge \( Q \) is placed on sphere 2. Sphere 1 is uncharged. Now the two are connected with a wire.

(a) Calculate the charge on each sphere.
(b) Calculate the potential of each sphere.
(c) Calculate the electric field at the surface of each sphere.

\[ V_1 = V_2 \]
\[ \frac{kQ_1}{R_1} = \frac{kQ_2}{R_2} \]
\[ Q_1 + Q_2 = Q \]

\[ \frac{k(Q-Q_2)}{R_1} = \frac{kQ_2}{R_2} \]
\[ Q_2 = \frac{kQ}{R_1 + R_2} \]
\[ Q_1 = Q - Q_2 = \frac{kQ}{R_1 + R_2} \]

\[ V_1 = \frac{kQ}{R_1} = \frac{kQ}{R_1 + R_2} \]
\[ V_2 = \frac{kQ}{R_2} = \frac{kQ}{R_1 + R_2} \]

\[ \vec{E}_1 = \frac{kQ_1}{R_1^2} \hat{r} \]
\[ \vec{E}_2 = \frac{kQ_2}{R_2^2} \hat{r} \]

\[ \vec{E}_1 \cdot \hat{r} = \frac{kQ}{R_1(R_1+R_2)} \]
\[ \vec{E}_2 \cdot \hat{r} = \frac{kQ}{R_2(R_1+R_2)} \]