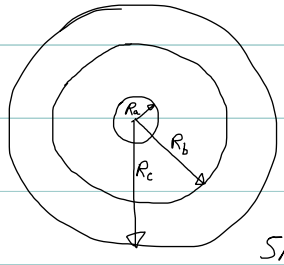

A SOLID CONDUCTING SPHERE OF RADIUS R_a IS PLACED INSIDE A CONDUCTING SPHERICAL SHELL OF INNER RADIUS R_b AND OUTER RADIUS R_c. THE INNER SPHERE HAS CHARGE +5QnC AND THE OUTER SHELL HAS UNIFORM VOLUME CHARGE DENSITY $\rho = \frac{+10Q}{\frac{4}{3}\pi(R_c^3 - R_b^3)}\ nCm^{-3}$

FIND THE ELECTRIC FIELD AND POTENTIAL AT $r < R_a$, $R_a < r < R_b$, $R_b < r < R_c$ AND $r > R_c$

(a) HOW ARE ρ, q (CHARGE) AND VOLUME RELATED? WHAT IS THE SHELL'S VOLUME? SO, WHAT IS THE CHARGE ON THE SHELL?

(b) AS WITH ESSENTIALLY ALL PROBLEMS IN ELECTROSTATICS, START WITH THE ELECTRIC FIELD. (c) WHAT IS THE E-FIELD INSIDE A CONDUCTOR? (d) HOW DOES CHARGE ON THE SHELL REORGANIZE ITSELF TO BALANCE THE E-FIELD IN THE CONDUCTOR?

(e) HENCE DETERMINE $\vec{E}$ (FROM GAUSS'S LAW) AT $r < R_a$, $R_a < r < R_b$, $R_b < r < R_c$ and $r > R_c$ (f) $\Delta V = V_{r_1} - V_{r_2} = \int_{r_1}^{r_2} \vec{E} \cdot d\vec{l}$ AND $V = V_r - V_\infty = \int_r^\infty \vec{E} \cdot d\vec{l} = -\int_\infty^r \vec{E} \cdot d\vec{l}$ (g) TO FIND THE POTENTIAL AT EACH r, PICTURE MOVING IN FROM ∞ (ZERO POTENTIAL) UNTIL YOU HIT EACH COMPONENT OF THE PROBLEM. SO, AT $r > R_c$, $V = -\int_\infty^r \vec{E} \cdot d\vec{l}$, AND, AT $R_b < r < R_c$, $V = -\int_\infty^{R_c} \vec{E} \cdot d\vec{l} - \int_{R_c}^r \vec{E} \cdot d\vec{l}$ etc.