Electric potential and potential energy

Problem 1

A spherical shell of radius $R$ has a total charge $+Q$ uniformly distributed on its surface. Find the electric potential distance at distances (a) $r = 0$, (b) $r = R/2$, (c) $r = R$, (d) $r = 2R$. You should set the potential to be zero very far from the center, i.e. $V(\infty) = 0$ Draw a graph of the electric potential as a function of $r$. HINT: Remember what the electric field due to a spherical shell is both outside and inside the shell. You can find the potential using $V_f - V_i = \int_i^f \vec{E} \cdot d\vec{r}$ and choosing your initial point to be at distance $r$ from the center and your final point out at infinity.

Problem 2

Repeat problem 1, but assume that there is an additional point charge $-Q$ located at the center of the sphere.

Problem 3

Seven charged particles are fixed in place to form a square with an edge length of $L$ as shown below. How much work must we do to bring a particle of charge $+2e$ initially at rest from an infinite distance to the center of the square.