Questions from Colin, with answers:

> I have a question on the first problem. When calculating the energy of the
> field for the case when a small dielectric sphere is placed in the region,
> are we supposed to find E outside the sphere using
> E(out) = E(0) - del(V(out)), as stated in class?

Not sure where the E(0) comes from; as far as I know the electric field is the negative gradient of the potential.

> While this is straight forward, do you then
> want us to calculate the energy by squaring E(out) and integrating over the
> volume?

Yes. And you need to work out the energy of the field inside the sphere as well.

> The reason I ask is that this integral appears to be very
> complicated and I was wondering if there was a simpler way of doing this or
> a hint to evaluate this? Thanks.

I don't know of a simpler way, but the integral is not very complicated.