1. (10 pts) Problem 3.49 in Griffths (3.45 in 4th ed). *A long cylindrical shell ...* To solve this problem, it helps if you have already worked through Problem 3.26, which yields the following result. In cylindrical coordinates, solutions of Laplace's equation can be written as

$$V(s,\phi,z) = a_0 + b_0 \, \ln s + \sum_{k=1}^{\infty} \Big[s^k \big(a_k \, \cos k\phi + b_k \, \sin k\phi \big) + s^{-k} \big(c_k \, \cos k\phi + d_k \, \sin k\phi \big) \Big] \, ,$$

assuming no dependence on z. Hint: use Eq. (2.36) to implement the boundary condition at the cylindrical shell.

2. (8 pts) Problem 3.50 in Griffths (3.46 in 4th ed). *A thin insulating rod ...* Hint: remember that for a line of charge along the z-axis with linear charge density $\lambda(z)$, the volume charge density is $\rho(\boldsymbol{r}) = \delta(x)\delta(y)\lambda(z)$ where $\delta(x)$ and $\delta(y)$ are Dirac delta functions.

3. (6 pts) Problem 3.51 in Griffths (3.47 in 4th ed). *Show that the average ...* To solve this problem, it helps if you have already worked through Problem 2.13, which yields the following result. The electric field inside of a uniformly charged sphere of radius R with volume charge density $\rho = Q/(4\pi R^3/3)$ is $\mathbf{E}(\mathbf{r}) = \rho r \hat{\mathbf{r}}/3\epsilon_0$ for $r \leq R$.

4. (4 pts) Problem 4.10 in Griffths (4.10 in 4th ed). *A sphere of radius ...*

5. (8 pts) Problem 4.11 in Griffths (same in 4th ed). *A short cylinder ...*

6. (4 pts) Problem 4.14 in Griffths (same in 4th ed). *When you polarize ...*