



Fall 2017

Physics 8100 - Electromagnetic Theory I



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Assignment # 4 (due to Monday, October 09, 2017)

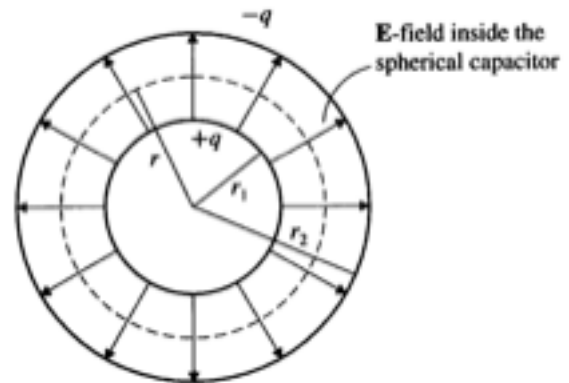
1) The parallel-plate capacitor: (30 points)

As an example of Gauss' law, calculate the field intensity and the capacitance in a parallel-plate capacitor, consisting of two conducting plates arranged parallel to each other at a separation d . The charge density on the plate is constant: $\sigma = \frac{q}{a}$ or $-\frac{q}{a}$, where q represents the entire charge on the plate.

To simplify the problem, neglect the stray fields at the edge of the capacitor and assume that there is no field outside of the capacitor.

2) The spherical capacitor: (30 points)

Calculate the capacitance of a capacitor consisting of two concentric spherical shells, with the radii of the spheres are r_1 and r_2 . Each sphere carries a uniformly distributed charge. The outer sphere has the negative charge $-q$, and the inner sphere has the positive charge q .



3) The cylindrical capacitor: (40 points)

Calculate the capacitance of a capacitor consisting of two coaxial cylinders of height h and radii r_1 and r_2 . Neglect the stray fields at the edges.

