Homework 11
EE 381 Electric & Magnetic Fields (Fall 2026)
Monday, November 9, 2026

1) PE6.4 As part of the solution process, find the general solutions for the potential V and electric field $\overline{E}$ between the conductors in spherical coordinates. Change point to (-2 m, 5 m, 3 m).

2) PE6.13 As part of solution process, find the electric flux density $\overline{D}$ and electric field $\overline{E}$ in the region between the conductors as well as the potential difference of surface $r = a$ that supports Q = 10 nC with respect to surface $r = b$ that supports - Q. Hint: Gauss' Law.

3) Two large metal plates are located at y = -2 cm and y = 5 cm with potentials of 12 V and 0 V respectively. If the plates are separated by a dielectric insulator ($\varepsilon = 2\varepsilon_0$ & $\sigma = 10^{-8}$ S/m), find the potential V between the plates. Then, determine the electric field $\overline{E}$ and electric flux density $\overline{D}$ between the plates as well as the surface charge density on each plate.

4) 6.12

5) A very long coaxial cable, located along the z-axis, has a center conductor for $\rho \le a$ = 8 mm and a shield at $\rho = b$ = 24 mm. Between the center conductor and shield, there is a dielectric insulator ($\varepsilon = 3\varepsilon_0$ & $\sigma = 10^{-6}$ S/m). Given $V(a)$ = 64 V and $V(b)$ = 0 V, find the potential V, electric field $\overline{E}$, and current density $\overline{J}$ between the center conductor and shield. Then, find the current I and resistance R between the center conductor and shield for a 1 km length of the cable.

Due Monday, November 16, 2026.

Notes:

- If not otherwise specified, assume units of meters for all positions and distances.
- Every problem should include a sketch of the problem geometry (if applicable).