Homework 10
EE 381 Electric & Magnetic Fields (Fall 2026)
Monday, November 2, 2026

1) PE5.7
2) 5.4
3) 5.11 For part a), first determine R_{Cu} and R_{Fe}. For part b), also determine the magnitude of the current density and electric field in each material. For part c), find the resistance if the entire conductor were solid copper rather than a composite. [Hint: Recall parallel resistor rules from EE 220.]
4) 5.19
5) 5.32
6) 5.38 Also, draw sketch of problem geometry.
7) 5.45 Also, draw sketch of problem geometry. Assume sphere centered on origin.
8) A conductor-dielectric planar interface is defined by $6y + 4z = 12$ m. Region 1, which includes the origin, has a relative permittivity of $\varepsilon_{r1} = 6$ (glass) and an electric field which points toward the conductor of magnitude $\left|\bar{E}_1\right| = 3600$ V/m. Region 2 is the conductor. Sketch the interface on *y*-*z* plane. Determine: a) the unit vectors $\hat{a}_{n,12}$ and $\hat{a}_{n,21}$ normal to the interface, b) the electric field, flux density, & polarization vectors in Region 1, c) the surface charge density at the interface, and d) the energy density in region 1.

Due Friday, November 6, 2026.

Hints/Notes:

- See Appendix B for material properties if they are not given in the problem.
- Can use the gradient function to find surface normal(s).
- 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).