EE331 — Homework #13 / Due Wednesday, Apr. 22, 2020 **at the beginning of class**

1. An infinitely long conductor of negligle radius along the z axis in free space carries a DC current of I_0 A in the positive z direction. Use the BS law to find $\mathbf{H}$ everywhere in space (away from infinity!).

2. Two circular loops of current parallel to the $z = 0$ plane are arranged to form a Helmholtz coil. The center of one loop is at (0,0,0) m, and the center of the other loop is at (0,0,4) m. The radius of each loop is 2 m, and each loop carries a current of 5 A in the $\widehat{\mathbf{a}}_\phi$ direction. Find the magnetic field at (a) (0,0,0) and (b) (0,0,2) m. Note that the goal of the Helmholtz coil arrangement is to produce a fairly uniform field in the center region between the loops.

3. (a) Ch. 7, Prob. 7.27 (use $I = \int \mathbf{J}\cdot\mathbf{ds}$ for part (b)) and (b) show that Ampere's law is true by finding the closed integral around the loop in part (b) of Prob. 7.27.

4. Ch. 7, Prob. 7.36.

5. (a) Write down Maxwell's equations in differential (point) form for static fields and identify or explain each of them as done in class and (b) 7.41(a).