PHYS 4330 ELECTRICITY & MAGNETISM II HOMEWORK ASSIGNMENT 02 DUE DATE: February 18, 2020

Instructor: Dr. Daniel Erenso

Name: _____

Mandatory problems: Any two of the problems

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1. A small loop of radius, b is held a distance r above the center of a larger loop with radius a. The small loop carries a current, I_1 , in a clockwise direction and the larger loop carries a current, I_2 , in a counterclockwise direction (both viewed from the top). The plane of the two loops are parallel and also perpendicular to the z-axis. (See Fig.1)



Figure 1: Two circular current carrying wires.

- (a) Find the flux through the little loop. (The little loop is so small and you may consider the field of the big loop to be essentially constant.)
- (b) Find the flux through the larger loop. (The little loop is so small that you may treat it as a magnetic dipole.)
- (c) Find the mutual inductance and confirm that $M_{12} = M_{21}$
 - 2. A long straight conductor carrying a current, I_1 , and ring of radius, a, carrying a current, I_2 , lie in the same plane as shown in Fig. 2 (i.e. y-z plane). The distance between the wire and the center of the ring is b. Find the mutual inductance M and force F between the two conductors.



Figure 2: A long wire and a circular loop on the y-z plane.

- 3. Griffiths Problem 7.26
- 4. Griffiths Problem 7.29

- 5. Griffiths Problem 7.32
- 6. Griffiths Problem 7.33