# 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
Student signature: $\qquad$

Comment: $\qquad$


| P \# | 1 | 2 | 3 | 4 | 5 | Score |
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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

