EE 382 – *Applied Electromagnetics*

Homework #1

10 points

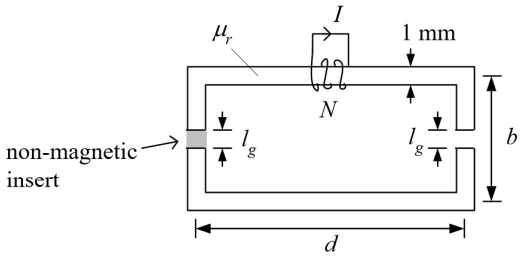
Date Assigned: 1/10	*Date Due*: 1/17

1-A-1 Text problem 8.49. Neglect flux leakage.

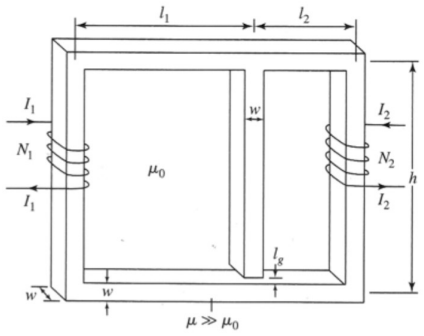
1-B-1 Text problem 8.50. Neglect both fringing in the air gap and flux leakage everywhere.

1-C-1 Text problem 8.51. Also determine the magnitude and direction of the magnetic flux density field in the air gap. Neglect both fringing in the air gap and flux leakage everywhere.

1-D-1 Compute $\overline{B}$ (including its direction) within the non-magnetic insert of the structure shown below when I = 5 A, N = 300 turns, d = 20 cm, b = 6 cm, and l_g = 0.1 mm. Neglect flux leakage everywhere and fringing in the air gap and the insert. The structure is made from a magnetic material with μ_r = 750 and has a square cross section with dimension 1 mm.



1-E-1 Compute the approximate value of the current I_2 such that the magnetic field in the air gap of the apparatus shown below is zero. Neglect both fringing in the air gap and flux leakage everywhere. The parameters are: I_1 = 3 A, N_1 = 150 turns, N_2 = 200 turns, $h = l_1$ = 10 cm, l_2 = 5 cm, w = 1 cm, l_g = 1 mm, μ = 1,500 μ_0.



1-F-1 The geometry of a solenoid and plunger unit is shown in the figure below. Compute the magnetic flux in the air gap and the magnetic flux density amplitude and direction in the air gap for the following parameters: $I = 4$ A, $N = 150$ turns, $h = 10$ cm, $l_p = w = 1$ cm, $l_g = 1$ mm, $l_s = 0.5$ mm, $\mu_c = 3{,}000\mu_0$, and $\mu_p = 2{,}000\mu_0$. Neglect both fringing in the air gap and flux leakage everywhere.