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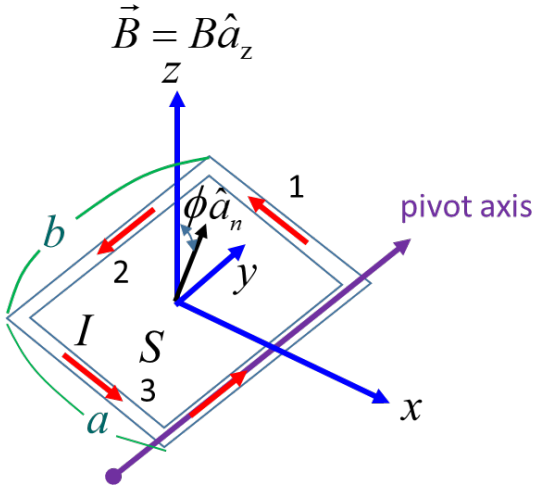
EE214000 Electromagnetics, Fall 2020

Your name: _____ ID: _____ Dec. 28th, 2020

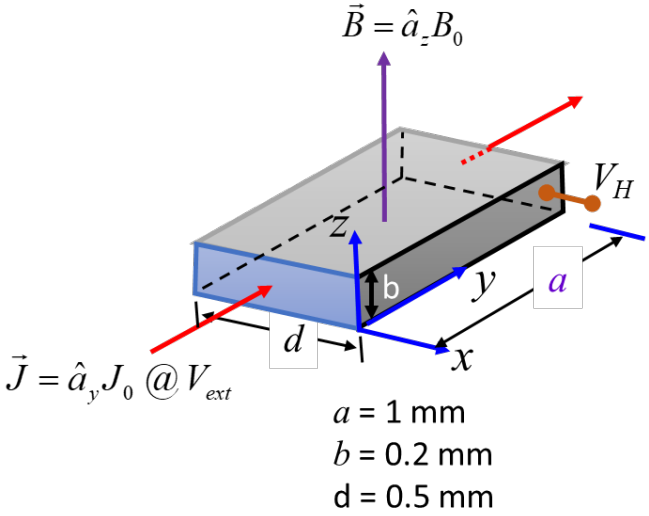
EE214000 Electromagnetics, Fall, 2020
Quiz #16-1, Open books, notes (22 points), due 11 pm, Wednesday, Dec. 30rd, 2020
(submission through iLMS)

Late submission won't be accepted!

1. Refer to the following coil with a current I in a magnetic field. Calculate the forces on the 1-3 wire segments and determine the torque on the wire loop. (8 points)



2. A piece of n-type semiconductor shown below is known to have a carrier density of 10^{19} electrons/cm^3. When under a magnetic field of 1 kG and applied with V_{ext} = 1 V, a uniform current of 1 A is generated along y. (9 points)
(1) What is the Hall voltage measured from this semiconductor? (2) What is the mobility of the electrons in this semiconductor? (3) what is the conductivity of this material?



3. Calculate the magnetic energy (3 points) stored in the following *N*-turn toroid and deduce the inductance of it (2 points). Assume the ferromagnetic material in the toroid has a permeability of μ. (5 points)