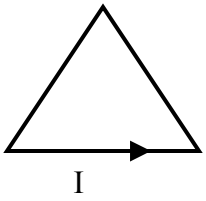
Preparation Assignments:

Due Monday, March 17

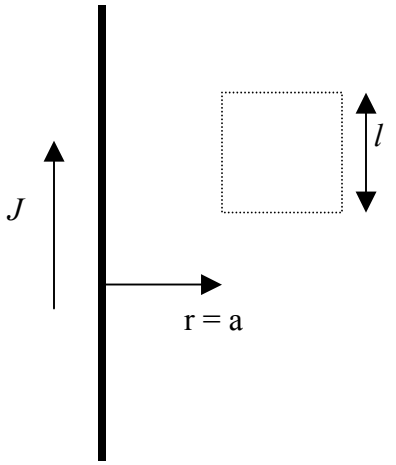


For the current loop in the above figure, determine the magnetic field at the center of the equilateral triangle with sides of length, *l*.

For the following magnetic field, determine the current density, $\vec{J}$, (cylindrical coordinates, this part has nothing to do with the above triangle):

$$\vec{H} = \begin{cases} J_o ar\hat{\phi} & [A/m] \quad r < a \\ \dfrac{J_o a^2}{r}\hat{\phi} & [A/m] \quad a < r \end{cases}$$

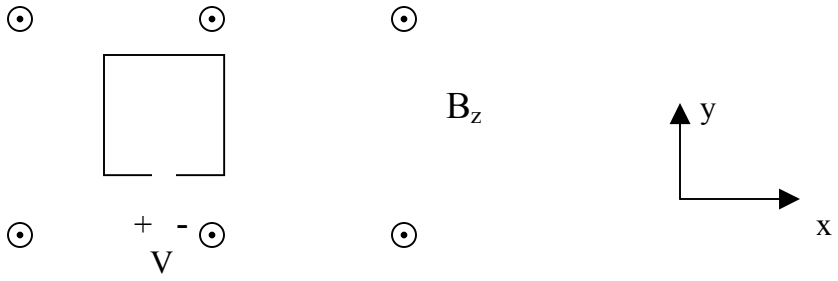
Due Wednesday, March 19 (Tuesday, March 18)



Using Ampere's Law, determine the field due to a long straight wire with a surface current density $\vec{J} = J_{so}$ [A/m] at $r = a$. In the above figure, the dark black line is the wire and the current flows in the +z-direction.

A square loop with sides of length, *l*, is coplanar with the wire. Determine the total flux through the loop.

Due Wednesday, March 26 (Tuesday, March 25)



A square loop is moving in a nonuniform magnetic field, $B_z = B_o x\, \hat{z}$ [Wb/m^2]. The loop is oriented such that the plane of the loop is perpendicular to the field. An oscilloscope is used to measure the EMF (voltage across the gap), with the polarity attached as indicated. Remember, an oscilloscope is effectively a large resistor.

If the loop is moving with constant velocity, $v = v_o\, \hat{x}$ [m/s], what is the EMF measured across the gab?

If the loop is moving with constant velocity, $v = v_o\, \hat{y}$ [m/s], what is the EMF measured across the gab?