Physics 4B
Fall 2017

Name: _____

Lab (circle one): 8:00 am 11:15 am 2:45 pm

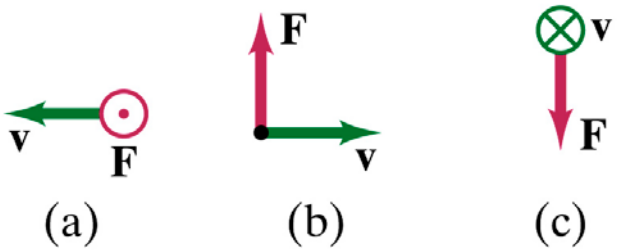
Quiz #7: Magnetic Fields

Problem 1 (3 points)
Determine the direction of the magnetic field **B** for each case in the figure below, where **F** represents the force on a *negatively charged* particle moving with velocity **v**.

a)

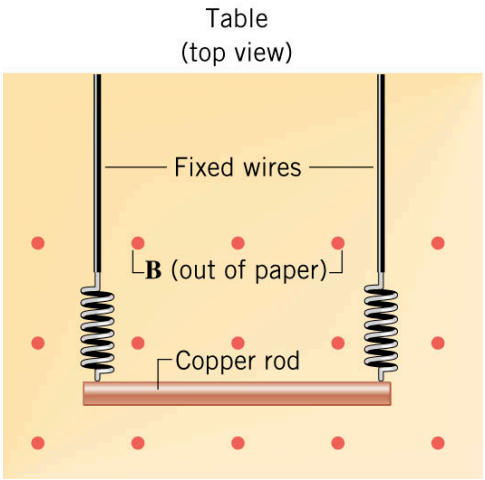
b)

c)



Problem 2 (3 points)
A copper rod of length 0.85 m is lying on a frictionless table (see the figure below). Each end of the rod is attached to a fixed wire by an unstretched spring that has a spring constant of k = 75 N/m. A magnetic field with a strength of 0.16 T is oriented perpendicular to the surface of the table. **(a)** What must be the direction of the (conventional) current in the copper rod that causes the springs to stretch? **(b)** If the current is 12.0 A, by how much does each spring stretch?

(Hint: the magnitude of the force exerted by a stretched spring is given by F = kx)



Problem 3 (4 points)

An electron traveling with a velocity of $\vec{v} = (2.0\times10^{4}\text{m/s})\hat{i} - (5.3\times10^{4}\text{m/s})\hat{k}$ enters a region of space that contains both an electric and a magnetic field. The net force on the electron from both fields is $\vec{F} = (1.5\times10^{-16}\text{N})\,\hat{j} - (5.7\times10^{-17}\text{N})\hat{k}$. If the magnetic field is $\vec{B} = (6.5\times10^{-3}T)\hat{i} + (1.8\times10^{-3}\text{T})\hat{k}$, what is the electric field in unit vector notation?