Physics 2212 CRN 24320 **Quiz 6** Name _____

1. In the diagram, a wire carries a current of 3.4 A in the -z-direction. A particle of charge $-8.7\,\mu C$ is fired at 142 m/s in the +z-direction a distance $d = 4\,cm$ from the wire.

   (a) Find the force, $\vec{F}$, on the charge. **SHOW ALL WORK**

$$B = \frac{\mu_0 I}{2\pi r} = \frac{(4\pi \times 10^{-7})(3.4\,A)}{2\pi(.04\,m)} = -1.7 \times 10^{-5}\,T\hat{j}$$

$$\vec{F} = q\vec{v} \times \vec{B}$$

$$\vec{F} = (-8.7 \times 10^{-6})(142\,m/s\hat{k}) \times (-1.7 \times 10^{-5}\,T\hat{j}) = -2.10 \times 10^{-8}\,N\hat{i}$$

   (b) If the particle has a mass of $120\,\mu g$, and the effects of gravity are neglected, find the radius of curvature for the path of the particle. **SHOW ALL WORK**

$$r = \frac{mv}{qB} = \frac{(120 \times 10^{-9}\,kg)(142\,m/s)}{(8.7 \times 10^{-6}\,C)(1.7 \times 10^{-5}\,T)} = 115212\,m$$