

Phys 3320 Electricity and Magnetism I
Fall 2018
Assignment 6

1. A square loop is defined by the points $(a,0)$, $(2a,0)$, (a,a) , and $(a,2a)$, all in the xy plane. There is a current I circulating around the loop in the clockwise sense (viewed looking down the z axis). Find the magnetic field at the point $(0,0,z)$.
2. A wire is made from three sections:
 - a. A straight wire from $x = -\infty$ to $x = -a$
 - b. $\frac{3}{4}$ of a circle from the point $(-a,0,0)$ to the point $(0,-a,0)$
 - c. A straight wire from $y = -a$ to $y = -\infty$There is a current I flowing from $x = -\infty$ to $y = -\infty$. Find the magnetic field at the origin.
3. For the wire in the previous problem find the magnetic field at the point $(0,0,z)$.
4. A *finite* length solenoid of length L and radius R contains N turns of wire ($N \gg 1$). There is a current I flowing in the wire. A point P lies on the axis of the solenoid, at a distance z from the nearest end. (Hint: since $N \gg 1$ take each turn of the solenoid to be a circular loop, and use the result from class for the field produced by such a loop).
 - a. Find the magnetic field at the point P
 - b. What is your result in the limit $L \rightarrow \infty$, assuming that the turns ratio (N/L) remains a constant?