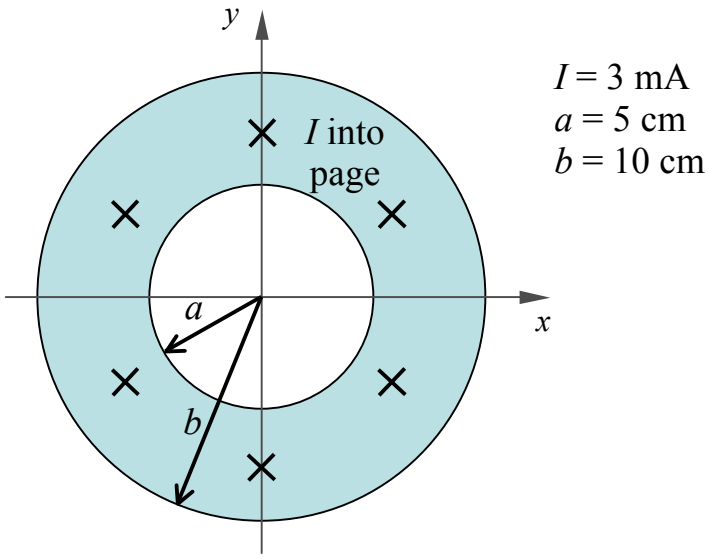
Name: _____ Sec. _____ **P212: Quiz 1, Week 9**

The figure shows a cylindrical metal wire with a hollow bore. The wire's inner radius is a and its outer radius is b. The wire carries a current I distributed uniformly across its cross-sectional area and flowing in the $-z$ direction (into the page).

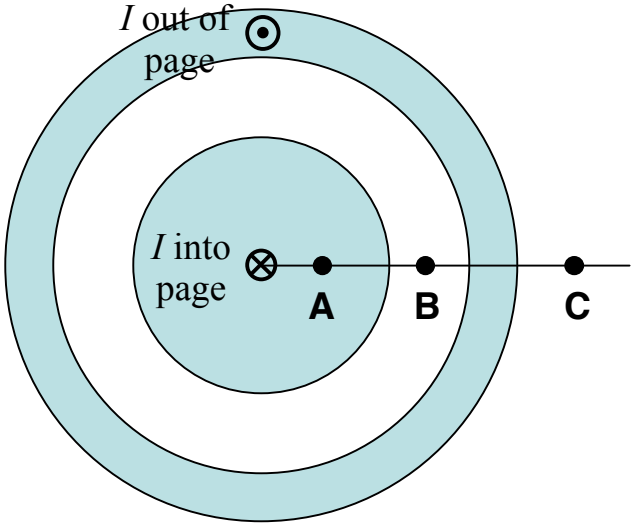


$I = 3$ mA
$a = 5$ cm
$b = 10$ cm

1) Find the magnitude and direction of the magnetic field $\boldsymbol{B}$ at the point x=15 cm, y=0, z=0 **[4]**

2) Find the magnitude and direction of the magnetic field $\boldsymbol{B}$ at the point x=0 cm, y=8 cm, z=0 cm **[8]**

3. A cylindrical wire of infinite length carries a total current *I* into the page. Surrounding it is a cylindrical conducting shell, carrying an equal current *I* in the opposite direction (out of the page). On the diagram provided below, draw vectors showing the direction and relative magnitude of the magnetic field at each of the indicated points **A**, **B**, and **C**. (For the magnitude, use *longer vectors* to indicate *larger B fields* … and if the field is zero, just write "0".) **[4]**



4) Calculate the magnitude of the magnetic field at the point **B** above using the following values: **[4]**

- Current magnitude I=2.5 A
- Radius of the inner cylinder = 6 cm
- Radius of the outer shell = 10 cm
- Distance from the center to the point **B** = 8 cm