Phys 222 SI Session #21

**Topics:** Magnetic fields around a current-carrying wire

Intro discussion: If you were mayor of a town, what would you do?

1. The figure shows two long wires carrying equal currents $I_1$ and $I_2$ flowing in opposite directions. Which of the arrows labeled A through D correctly represents the direction of the magnetic field due to the wires at a point located at an equal distance $d$ from each wire?

2. A rectangular coil, with corners labeled ABCD, of length $L$ and width $w$ is placed in a magnetic field $B$ as shown in the Figure. If there is a current $I$ flowing through this coil, what is the force acting on section BC of this coil?

3. As shown in the figure, a wire is bent into the shape of a tightly closed omega ($\Omega$), with a circular loop of radius 4.0 cm and two long straight sections. The loop is in the xy-plane, with the center at the origin. The straight sections are parallel to the x-axis. The wire carries a 5.0-A current, as shown. What is the magnitude of the magnetic field at the center of the loop?

4. The figure shows four different sets of insulated wires that cross each other at right angles without making electrical contact. The magnitude of the current is the same in all the wires, and the directions of current flow are as indicated. For which (if any) configuration will the magnetic field at the center of the square formed by the wires be equal to zero?

5. Two conductors carry current perpendicular to the page, as shown. What are the magnetic field components ($B_x$, $B_y$) at the origin, in T?