Phys 222 SI Session #22

**Topics:** Ampère’s Law

Intro discussion: What type of noodle is best?

1. Three curves, A, B, and C, lie in the plane of the paper. There are currents of equal magnitude running into and out of the paper, as shown. Which curve has the largest positive value of $\oint B \cdot dl$, if the line integral is done in the clockwise direction in each case?

2. Assume a circular Ampèrian loop of radius $R$ with its plane parallel the $xy$ plane and its center at the origin. A magnetic field in space is given by the function $\mathbf{B} = B_0 \cos \theta \hat{\theta}$. What is the total current enclosed by the Ampèrian loop?

3. There are several wires in spaces carrying different currents (see figure). What is the result of integrating the $\mathbf{B}$ field along a circular path of radius $r = 1\text{m}$ in the direction shown in the figure?

4. A solid cylindrical conductor has radius 4.0 cm. If the current flowing in the conductor is 40 A and uniformly distributed across its cross-sectional area, what is the magnitude of the magnetic field at a distance of 2.0 cm from the axis of the conductor, in T?

5. Three long parallel wires with current perpendicular to the page are arranged as shown. The wires have equal length. Which pair of wires has the largest repulsive force?