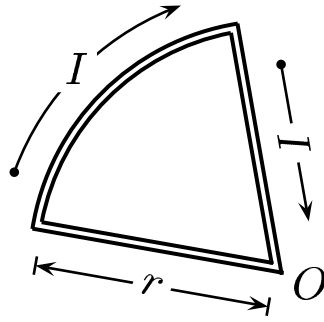


A current loop consists of one circular arc subtended by an angle  $\alpha$ , and two radial segments. There is a clockwise current  $I$  and the radius is  $r$ .



The direction of the magnetic field at the center  $O$

- A) is into the paper.
- B) is out of the paper.
- C) cannot be determined since  $B = \infty$ .
- D) cannot be determined since  $B = 0$ .

Based on the Biot-Savart law,  $\delta\vec{B} = \frac{\mu}{4\pi} \frac{\vec{r} \times i \delta\vec{L}}{r^3}$ . Taking the cross

product, one finds that for any current segment along the circle, the cor-

responding  $\delta\vec{B}$  at the center always points into the paper and the currents along the two radial segments do not contribute to the magnetic field at the center.

So  $\vec{B}$  due to the entire current loop should also point into the paper.

Answer **A**.

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