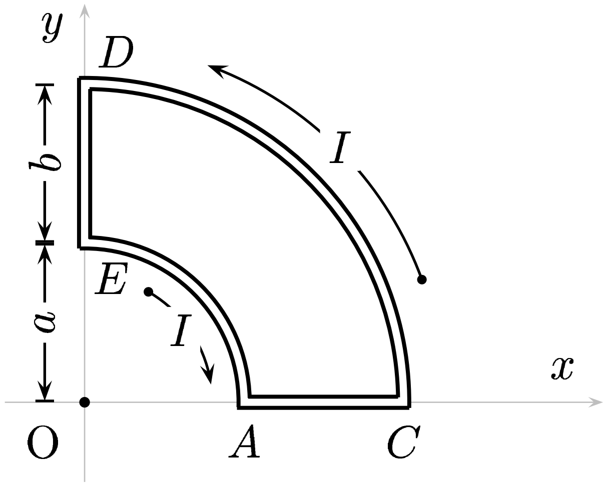

Current I flows around the loop $ACDE$ in a counter-clockwise direction.

The direction of the magnetic field $\vec{B}$ at O due to the current loop

A) is out of the page.
B) is into the page.
C) is $\vec{B} = 0$
D) can't be determined.
E) is at an angle of 45° counter-clockwise from $+\hat{\imath}$ in the xy-plane.

$\vec{B} = \vec{B}_{AC} + \vec{B}_{CD} + \vec{B}_{DE} + \vec{B}_{EA}$, where $\vec{B}_{AC}$, $\vec{B}_{DE}$ are the magnetic fields due to line segments $\overline{AC}$ and $\overline{DE}$ respectively; and where $\vec{B}_{CD}$, $\vec{B}_{EA}$ are the magnetic fields due to the arcs $\overline{CD}$ and $\overline{EA}$, respectively. According to the Biot-Savart law, we have

$$\delta\vec{B} = \frac{\mu}{4\pi}\,\frac{\vec{r}\times I\,\delta\vec{L}}{r^3}, \quad \text{so for arcs,} \quad \|\vec{B}\| = \frac{\mu_0}{4\pi}\,\frac{I\,r\,\pi}{2\,r^2}\bigg|_{r=a \text{ or } a+b}.$$

$$\text{At } O, \quad \vec{B}_{DE} = \vec{B}_{EA} = 0, \quad \text{and}$$

$$B_{AC} = \frac{\mu_0\,I}{8\,a} \quad \text{(into the paper) and}$$

$$B_{CD} = \frac{\mu_0\,I}{8\,(a+b)} \quad \text{(out of the paper).}$$

Since $B_{AC} > B_{CD}$, the resultant $\vec{B}$ due to the entire current loop will point into the paper.

Answer **B**.