

71. (a) As illustrated in Sample Problem 30-1, the radial segments do not contribute to \vec{B}_P and the arc-segments contribute according to Eq. 30-11 (with angle in radians). If \hat{k} designates the direction “out of the page” then

$$\vec{B} = \frac{\mu_0(0.40 \text{ A})(\pi \text{ rad})}{4\pi(0.050 \text{ m})} \hat{k} - \frac{\mu_0(0.80 \text{ A}) \left(\frac{2\pi}{3} \text{ rad}\right)}{4\pi(0.040 \text{ m})} \hat{k}$$

which yields $\vec{B} = -1.7 \times 10^{-6} \hat{k} \text{ T}$.

- (b) Now we have

$$\vec{B} = -\frac{\mu_0(0.40 \text{ A})(\pi \text{ rad})}{4\pi(0.050 \text{ m})} \hat{k} - \frac{\mu_0(0.80 \text{ A}) \left(\frac{2\pi}{3} \text{ rad}\right)}{4\pi(0.040 \text{ m})} \hat{k}$$

which yields $\vec{B} = -6.7 \times 10^{-6} \hat{k} \text{ T}$.