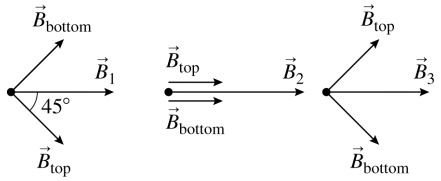
32.15. Model: Assume the wires are infinitely long.
Visualize: ⊙ 10 A



⊗ 10 A

The field vectors are tangent to circles around the currents. The net magnetic field is the vectorial sum of the fields $\vec{B}_{\text{top}}$ and $\vec{B}_{\text{bottom}}$. Points 1 and 3 are at a distance $d = \sqrt{2}$ cm from both wires and point 3 is at a distance $d = 1$ cm.
Solve: The magnetic field at points 1, 2, and 3 are

$$\vec{B}_1 = \vec{B}_{\text{top}} + \vec{B}_{\text{bottom}} = \frac{\mu_0 I}{2\pi d}\left(\cos 45^\circ \hat{i} - \sin 45^\circ \hat{j}\right) + \frac{\mu_0 I}{2\pi d}\left(\cos 45^\circ \hat{i} + \sin 45^\circ \hat{j}\right)$$

$$= \frac{\mu_0 I}{2\pi d} 2\cos 45^\circ \hat{i} = \frac{\left(2\times 10^{-7}\ \text{T m / A}\right)(10\ \text{A})}{\sqrt{2}\times 10^{-2}\ \text{m}} 2\left(\frac{1}{\sqrt{2}}\right)\hat{i} = 2.0\times 10^{-4}\,\hat{i}\ \text{T}$$

$$\vec{B}_2 = \frac{\mu_0 I}{2\pi d}\hat{i} + \frac{\mu_0 I}{2\pi d}\hat{i} = 2\frac{\left(2\times 10^{-7}\ \text{T m / A}\right)(10\ \text{A})}{1\times 10^{-2}\ \text{m}}\hat{i} = 4.0\times 10^{-4}\,\hat{i}\ \text{T}$$

$$\vec{B}_3 = \frac{\mu_0 I}{2\pi d}\left(\cos 45^\circ \hat{i} + \sin 45^\circ \hat{j}\right) + \frac{\mu_0 I}{2\pi d}\left(\cos 45^\circ \hat{i} - \sin 45^\circ \hat{j}\right) = 2.0\times 10^{-4}\,\hat{i}\ \text{T}$$