61. (a) We find the field by superposing the results of two semi-infinite wires (Eq. 30-9) and a semicircular arc (Eq. 30-11 with $\phi = \pi$ rad). The direction of $\vec{B}$ is out of the page, as can be checked by referring to Fig. 30-6(c). The magnitude of $\vec{B}$ at point $a$ is therefore

$$B_a = 2\left(\frac{\mu_0 i}{4\pi R}\right) + \frac{\mu_0 i\pi}{4\pi R} = \frac{\mu_0 i}{2R}\left(\frac{1}{\pi} + \frac{1}{2}\right) .$$

With $i = 10$ A and $R = 0.0050$ m, we obtain $B_a = 1.0 \times 10^{-3}$ T. The direction of this field is out of the page, as Fig. 30-6(c) makes clear.

(b) The last remark in the problem statement implies that treating $b$ as a point midway between two infinite wires is a good approximation. Thus, using Eq. 30-6,

$$B_b = 2\left(\frac{\mu_0 i}{2\pi R}\right) = 8.0 \times 10^{-4} \text{ T} .$$

This field, too, points out of the page.