59. (a) For the circular path L of radius r concentric with the conductor

$$\oint_L \vec{B} \cdot d\vec{s} = 2\pi r B = \mu_0 i_{\text{enc}} = \mu_0\, i\, \frac{\pi(r^2 - b^2)}{\pi(a^2 - b^2)} \,.$$

Thus,

$$B = \frac{\mu_0 i}{2\pi(a^2 - b^2)} \left(\frac{r^2 - b^2}{r}\right) \,.$$

(b) At $r = a$, the magnetic field strength is

$$\frac{\mu_0 i}{2\pi(a^2 - b^2)} \left(\frac{a^2 - b^2}{a}\right) = \frac{\mu_0 i}{2\pi a} \,.$$

At $r = b$, $B \propto r^2 - b^2 = 0$. Finally, for $b = 0$

$$B = \frac{\mu_0 i}{2\pi a^2} \frac{r^2}{r} = \frac{\mu_0 i r}{2\pi a^2}$$

which agrees with Eq. 30-22.

(c) The field is zero for $r < b$ and is equal to Eq. 30-19 for $r > a$, so this along with the result of part (a) provides a determination of B over the full range of values. The graph (with SI units understood) is shown below.