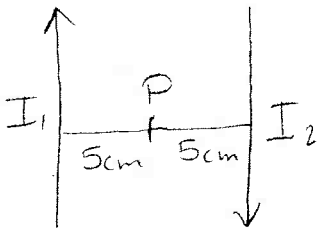
P #38

Ch 19 - pg 615

a) $I_1 = 5.0\,A = I_2$
$r_1 = .05\,m = r_2$



By right hand rule, I find:

B_1 = in.

B_2 = in

$$B_1 = B_2 = \frac{\mu_0 \cdot I}{2\pi r} = \frac{(4\pi \times 10^{-7}\,T\cdot m/A)(5.0\,A)}{2\pi(.05\,m)}$$

$$B_1 = B_2 = 2.0 \times 10^{-5}\,T$$

$$B_{12} = B_1 + B_2 = 2\cdot(2 \times 10^{-5}\,T)$$

$$\boxed{B_{12} = 4.0 \times 10^{-5}\,T,\ in}$$

b) $I_1 = I_2 = 5.0\,A$
$r_1 = .20\,m$
$r_2 = .10\,m$

$$B_1 = \frac{\mu_0 \cdot I}{2\pi r} = \frac{(4\pi \times 10^{-7}\,T\cdot m/A)(5.0\,A)}{2\pi(.20\,m)} = 5.0 \times 10^{-6}\,T\ (in)$$

$$B_2 = \frac{\mu_0 \cdot I}{2\cdot\pi r} = \frac{(4\pi \times 10^{-7}\,T\cdot m/A)(5.0\,A)}{2\cdot\pi(.10\,m)} = 1.0 \times 10^{-5}\,T\ (out)$$

$$B_{12} = B_2 - B_1 = (1.0 \times 10^{-5}\,T) - (5.0 \times 10^{-6}\,T)$$

$$\boxed{B_{12} = 5.0 \times 10^{-6}\,T\ (out)}$$