

3. (a) The field due to the wire, at a point 8.0 cm from the wire, must be $39\text{ }\mu\text{T}$ and must be directed due south. Since $B = \mu_0 i / 2\pi r$,

$$i = \frac{2\pi r B}{\mu_0} = \frac{2\pi(0.080\text{ m})(39 \times 10^{-6}\text{ T})}{4\pi \times 10^{-7}\text{ T}\cdot\text{m/A}} = 16\text{ A} .$$

- (b) The current must be from west to east to produce a field which is directed southward at points below it.