

7. The cross-sectional area of wire is given by  $A = \pi r^2$ , where  $r$  is its radius (half its thickness). The magnitude of the current density vector is  $J = i/A = i/\pi r^2$ , so

$$r = \sqrt{\frac{i}{\pi J}} = \sqrt{\frac{0.50 \text{ A}}{\pi(440 \times 10^4 \text{ A/m}^2)}} = 1.9 \times 10^{-4} \text{ m} .$$

The diameter of the wire is therefore  $d = 2r = 2(1.9 \times 10^{-4} \text{ m}) = 3.8 \times 10^{-4} \text{ m}$ .