

10. (a) $\theta = \sin^{-1}(0.011 \text{ cm}/3.5 \text{ m}) = 0.18^\circ$.

(b) We use Eq. 37-6:

$$\alpha = \left(\frac{\pi a}{\lambda} \right) \sin \theta = \frac{\pi(0.025 \text{ mm}) \sin 0.18^\circ}{538 \times 10^{-6} \text{ mm}} = 0.46 \text{ rad} .$$

(c) Making sure our calculator is in radian mode, Eq. 37-5 yields

$$\frac{I(\theta)}{I_m} = \left(\frac{\sin \alpha}{\alpha} \right)^2 = 0.93 .$$