1. (Prob. 10.25) From Eqn. 10.57 the radius of the light spot on the moon is the radius of the first dark ring, or

\[ q_1 = \frac{1.22 \times R \times \lambda}{2a} = \frac{1.22 \times 376 \times 10^6 m \times 632.84 \times 10^{-9} m}{2 \times 10^{-3} m} = 1.45 \times 10^5 m. \]

2. (Prob. 10.30) From Eqn. 10.32 the 3rd order maximum is at angle \( \theta_3 \) determined by

\[ \sin \theta_3 = 3\lambda/a = 3 \times 500 \times 10^{-9} m / 0.60 \times 10^{-5} m = 0.25, \]

or \( \theta_3 = 14^\circ. \)

3. On the spiral on p. 500 in Hecht the distance between (1/2,1/2) (\( u - \infty \)) and (-1/2,-1/2) (\( u - \infty \)) is about 10 cm, representing the incident or unobstructed amplitude. The longest distance from (1/2,1/2) to another point on the spiral is about 11.7 cm for a point near \( u = -1.25 \). This tells us that

\[ \frac{I_{\text{max}}}{I_{\text{unobst}}} \approx (11.7/10.0)^2 = 1.37. \]

Going to larger negative u’s the distance from (1/2,1/2) becomes a (local) minimum of about 8.8 cm near \( u = -1.9 \), giving

\[ \frac{I_{\text{localmin}}}{I_{\text{unobst}}} \approx (8.8/10.0)^2 = 0.77. \]

These values are consistent with those at points (4) and (5) in Fig. 10.59(b).

(Numerical calculations give the more accurate values

\[ \frac{I_{\text{max}}}{I_{\text{unobst}}} = 1.37044. \]

at \( u = -1.2172 \) and

\[ \frac{I_{\text{localmin}}}{I_{\text{unobst}}} = 0.77825 \]

at \( u = -1.8725 \).