

Physics 202

Week of December 12, 2005

Pre-Lab QUIZ: Diffraction and Interference LC-1

1. You weren't asked to read Chapter 38 on "Diffraction", but essentially it is the same phenomenon as interference. Looking at Serway pages 1207 and 1208, derive the expression for the angular separation of the first minimum from the central peak in a single slit diffraction pattern. That is, show that $\theta \sim \lambda/a$ for single-slit diffraction.
2. For the case of single-slit diffraction, assume $\lambda = 633 \text{ nm}$, a slit width of 0.04 mm and that the diffraction pattern appears on a screen 2.0 m from the slit, compute the expected separation (in mm) between the diffraction maxima.
3. Why is it important that the slits be parallel to each other (both for single slit and multiple slit interference)?
4. For the case of double-slit interference, assume $\lambda = 633 \text{ nm}$, a slit separation of 0.25 mm , and that the interference pattern appears on a screen 2.0 m from the slits, compute the expected separation (in mm) between interference maxima.
5. Will the width of the individual slit have an effect on your answer to the previous question?