P10.W − Diffraction

1. Determine the wavelength of monochromatic light that produces an order $m = 1$ fringe pattern on the screen at $\theta = 25^o$ when it is indicent upon a diffraction grating of 5200 lines/cm.

2. Match the correct approximation(s) on the right with each statement on the left. Note that a is the width of a single slit and λ is the wavelength of light incident on that slit.

   a. $a << \lambda$

   b. $a \sim \lambda$

   c. $a >> \lambda$

   A. The ray approximation is no longer valid. Light is wavelike.

   B. The primary effect of the opening is to act like a point source of waves.

   C. The primary effect of the opening is minimal; light travels in a straight line through it.

   D. The primary effect of the openng is to diffract the light.

3. Explain, in a single sentence, how diffraction affects multiple-slit patterns. Sketch the intensity patterns as a function of $sin\theta$, where θ is the angle of incidence, for a two-slit and three-slit setup. Assume $a \sim \lambda$.