

## CLASS EXERCISE #20 - 25 July 2005

Light of wavelength 500 nm is incident on a pair of slits. On a screen 2.0 m away, the interference maxima are found to be 2.0 mm apart.

(a) Determine the angle  $\theta$  (in radians and in degrees) corresponding to the first interference maximum.

(b) Determine the separation of the slits.

(a)  $\tan \theta = (2.0 \text{ mm})/(2.0 \text{ m}) = 0.0010$  so

$$\theta = \tan^{-1} (0.0010) = 0.0010 \text{ radians or } 0.057^\circ$$

(b) From  $d \sin \theta = m\lambda$  we have, for  $m = 1$ ,

$$d = m\lambda/\theta = (1)(500 \times 10^{-9} \text{ m})/\sin (0.0010 \text{ rad}) =$$

$$500 \times 10^{-9} \text{ m}/0.0010 = 5 \times 10^{-4} \text{ m} = 0.50 \text{ mm}$$