Solution HW5.

Phys 375

1. 8-1) $m\lambda = 2d \quad m = \frac{2d}{\lambda}$

$$523 = \frac{2 \times 0.014\ (cm)}{\lambda}$$

$$\lambda = 435.9\ (nm)$$

2. 8-5) a. $t_1 = \frac{L}{c} \quad t_2 = \frac{L}{v}$

$$c\Delta t = c2\left(\frac{1}{v} - \frac{1}{c}\right) = 2(n-1) \qquad n = \frac{c}{v}$$

$$\frac{2c\Delta t}{\lambda} = N \qquad \Delta = \frac{\lambda N}{2} - 1$$

b. $N = 153$.

3) one mode is constructive and another mode is destructive

so $m = m' + \frac{1}{2}$ (not 1)

$$\frac{2d_1}{\lambda} = \frac{2d_1}{\lambda'} + \frac{1}{2}$$

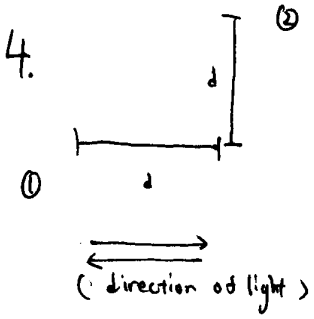
$$\frac{d_1}{\lambda} - \frac{d_1}{\lambda'} = \frac{1}{4} \qquad \text{assume } \lambda \approx \lambda'$$

$$d_1 \frac{\Delta\lambda}{\lambda^2} = \frac{1}{4}$$

$$\Delta\lambda = \frac{\lambda^2}{4d_1} \qquad \text{so } d_1 \approx 0.05(m) = 5\ (cm)$$

which is too long

4.



$d = 0.1\,m$

$\lambda = 633\,nm$

for ② $t_2 = \frac{2d}{c}$

① $t_1 = \frac{d}{c+v} + \frac{d}{c-v}$

$2\Delta d = c\Delta t = m\lambda$

plug in d & v calculate Δt.

then $m \approx 0.003 \Rightarrow$ 0 fringe.