

HW12 Key

$$1. \delta (D_1 - D_2) = \boxed{(m + \frac{1}{2}) \lambda} \quad m = 0, \pm 1, \pm 2 \dots$$

$$2. t = \frac{(m + \frac{1}{2}) \lambda}{2n}, \quad t \downarrow, \lambda \downarrow,$$

shift toward short wavelength, blue.

$$3. \theta = \tan^{-1} \frac{0.350}{271} \Rightarrow \theta = 0.074$$

$$d \sin \theta = \lambda = 0.45 \times 10^{-3} \times \sin 0.074 = \boxed{581 \text{ (nm)}}$$

4. (a) greater. $n_p > n_c$

$$(b) t = \frac{(m + \frac{1}{2}) \lambda}{2n} \Rightarrow \lambda = \frac{2nt}{m + \frac{1}{2}}$$

$$\Rightarrow \lambda = \frac{332.1 \text{ nm}}{m + \frac{1}{2}}, \quad m = 0, \pm 1, \pm 2 \dots$$

since visible light has wavelength in range 400-700 nm,

$$\lambda = \frac{332.1 \text{ nm}}{0 + \frac{1}{2}} = \boxed{664.2 \text{ nm}}$$