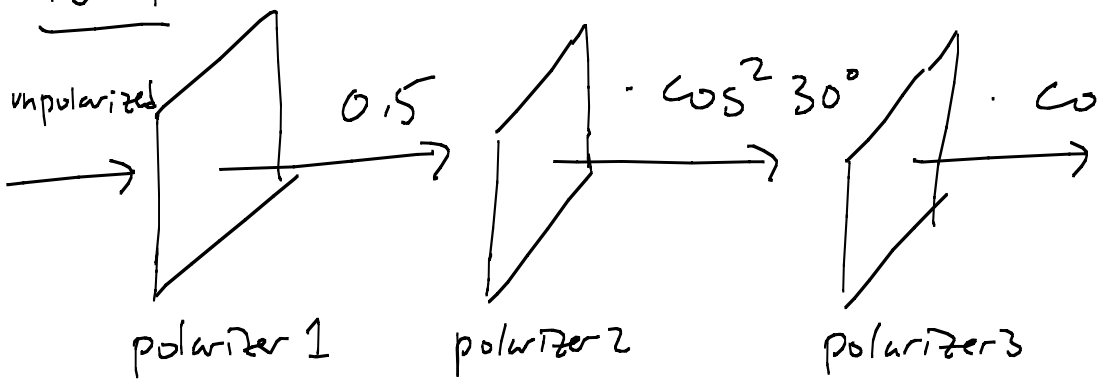
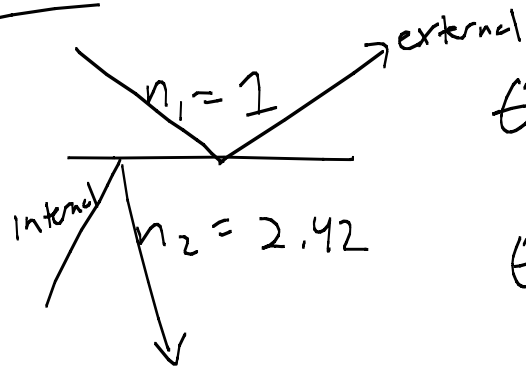
15-1



$$= \frac{1}{2} \cdot \frac{3}{4} \cdot \frac{3}{4} = \frac{9}{32}$$

15-2



$$\theta_B = \tan^{-1} \frac{n_1}{n_2} = 0.39_{rad} \sim 22.5° \quad \text{(internal)}$$

$$\theta_B = \tan^{-1} \frac{n_2}{n_1} = 1.18 \text{ rad} \sim 67.5 \quad \text{(external}$$

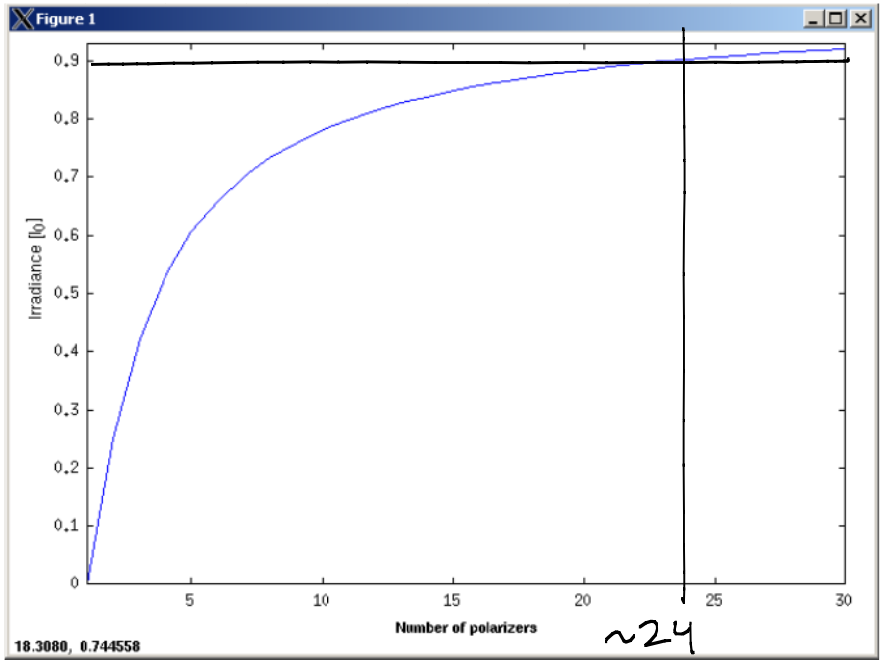
15-4

$$\Delta n = 1.599 - 1.594 = 0.005$$

$$\Delta n d = \frac{632 nm}{2} = 316 nm$$

$$d = 63.2 \ \mu m$$

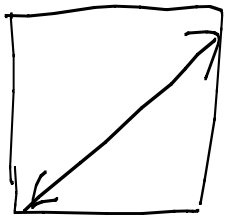
15-8 $\cos^{2N}\frac{\pi}{2N} = 0.9$



15-11 linear → circular ∴ QWP

$\Delta nd = \frac{6\times10^{-5}\,cm}{4}$

$\Delta n = \frac{6\times10^{-5}\,cm}{4\cdot 3\times10^{-3}\,cm} = 5\times10^{-3}$



OA @ 45° deg from linear pol, axis.

15-13

(a) circular pol. light AND unpolarized light

(b) elliptically pol. light

15-24

$$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} e^{i\pi/2} & 0 \\ 0 & -e^{i\pi/2} \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

↑ linear pol. @ horizontal

HWP, FA θ from vertical

↑ vertical pol. light

$$= \begin{bmatrix} -2\cos\theta\sin\theta \\ 0 \end{bmatrix} e^{i\pi/2} = e^{i\pi/2} \begin{bmatrix} -\sin 2\theta \\ 0 \end{bmatrix} \qquad I = \sin^2 2\theta$$