Opti 501 **Solutions**

Problem 25) We have seen that $\tan\theta_B = n_o$ and $\sin\theta_B = n_o \sin\theta_B'$ (Snell's law). Therefore,

$$\tan\theta_B = \sin\theta_B/\cos\theta_B = n_o \quad \rightarrow \quad \sin\theta_B = n_o \cos\theta_B.$$

$$n_o \sin\theta_B' = \sin\theta_B \quad \rightarrow \quad n_o \sin\theta_B' = n_o \cos\theta_B \quad \rightarrow \quad \sin\theta_B' = \cos\theta_B = \sin(\frac{\pi}{2} - \theta_B)$$

$$\rightarrow \quad \theta_B' = \frac{\pi}{2} - \theta_B \quad \rightarrow \quad \theta_B + \theta_B' = \frac{\pi}{2}.$$

b) $\theta_B' = \frac{\pi}{2} - \theta_B \rightarrow \begin{cases} \sin\theta_B' = \cos\theta_B \\ \cos\theta_B' = \sin\theta_B \end{cases} \rightarrow \quad \tan\theta_B' = 1/\tan\theta_B = 1/n_o.$

We conclude that θ_B' is the Brewster angle of incidence on the second facet of the plate.