

# THE UNIVERSITY OF TEXAS AT DALLAS



## Physical Optics

EE 6317

### Spring 2008 Assignment 4

#### Due Date:

June 25, 2008

#### Reading:

Eugene Hecht, *Optics*, Fourth Edition, Chapters 5 and 6

#### Reference Material:

Dr. Cantrell's slides on geometrical optics

#### Problems:

Please write your answers to the following problems on engineering paper. No credit will be given for work handed in on other types of paper.

1. Calculate the ratio of the full width at the 3 dB points (FWHM) to the separation between adjacent maxima for a Fabry-Pérot interferometer with reflectivities  $\rho_{12} = 0.5, 0.8, 0.9, 0.98$  and  $0.999$ .
2. Find the minimum value of the finesse of a Fabry-Pérot interferometer needed to resolve two spectral lines such that  $\Delta\lambda/\lambda = 10^{-3}$ .
3. Find the range of angles near Brewster's angle such that the magnitude of the reflectivity for light polarized in the plane of incidence,  $\rho_{\parallel}$ , is less than or equal to 0.03, for the following two cases:
  - (a)  $n_1 = 1.00, n_2 = 1.33$  (air-water interface)
  - (b)  $n_1 = 1.00, n_2 = 1.50$  (air-glass interface)