

**Physics 422 - Spring 2013 - Assignment #10, Due April 15<sup>th</sup>**

1. (*Hecht, 9.12*) With regard to Young's Experiment, derive a general expression for the shift in the vertical position of the  $m^{\text{th}}$  maximum as a result of placing a thin parallel sheet of glass of index  $n$  and thickness  $d$  directly over one of the slits. Identify your assumptions.
2. (*Hecht, 9.22*) What is the general expression for the separation of the fringes of a Fresnel biprism of index  $n$  immersed in a medium having an index of refraction  $n'$ ?
3. (*Hecht, 9.33*) Fringes are observed when a parallel beam of light of wavelength 500 nm is incident perpendicularly onto a wedge-shaped film with an index of refraction of 1.5. What is the angle of the wedge if the fringe separation is 1/3 cm?
4. (*Hecht, 9.37*) Suppose we place a chamber 10.0 cm long with flat parallel windows in one arm of a Michelson Interferometer that is being illuminated by 600 nm light. If the refractive index of air is 1.00029 and all the air is pumped out of the cell, how many fringe-pairs will shift by in this process?
5. (*Hecht, 9.47*) A glass camera lens with an index of 1.55 is to be coated with cryolite film ( $n \approx 1.30$ ) to decrease the reflection of normally incident green light ( $\lambda_0 = 500 \text{ nm}$ ). What thickness should be deposited on the lens?