

Assignment 5B

Due Thursday, June 8

Physics U603

Summer 1 2006

1. Hecht, Ch. 4: 4; Ch. 7: 22, 29
2. Derive the expression given in Hecht 7: 29 from Eq. 4.81.
3. The file `mysterymetal.txt` contains real and imaginary parts of the complex index of refraction as a function of vacuum wavelength λ_0 for an unknown metal. (These data were obtained from the website www.luxpop.com)
 - (a) Calculate and plot the reflectance as a function of λ_0 . Your plot should be accurately labelled and cover the full wavelength range of the data provided.
 - (b) From your plot, estimate the plasma frequency ω_p .
 - (c) Calculate and plot the skin depth as a function of λ_0 .
 - (d) You are now told that this is one of the coinage metals (copper, silver, gold). Explain which of these possibilities is consistent with the optical properties that you have plotted.