Assignment 8.2

Question 1:

Consider the reflection of light at normal incidence on a boundary between GaAs crystal of refractive index 3.6 and air of refractive index 1.

a) If the light is traveling from air to GaAs, what is the reflection coefficient and the intensity of the reflected light in terms of the incident light? Comment on the phase change.

b) If the light is traveling from GaAs to air, what is the reflection coefficient and the intensity of the reflected light in terms of the incident light? Comment on the phase change.

Question 2:

a) Consider three dielectric media with flat and parallel boundaries with refractive indices n_1, n_2 and n_3. Show that for normal incidence the reflection coefficient between 1 and 2 is the same as that between layers 2 and 3 if $n_2 = \sqrt{(n_1 n_3)}$.

b) Consider a Si photodiode that is designed at 900 nm. Given a choice of two possible antireflection coatings, SiO_2 with a refractive index of 1.5 and TiO_2 with a refractive index of 2.3, which would you use and what would be the thickness of the antireflection coating you chose? The refractive index of Si is 3.5.