Assignment 8.1

Question 1:
Using the Cauchy dispersion, calculate the refractive index of diamond at 450 nm. (Cauchy coefficients from Table 9.2)

Question 2:
Using $n = \sqrt{\varepsilon_r}$, calculate the refractive index n of the crystals in the table given their low frequency permittivities ε_r (LF). What is your conclusion compared to the measured n values?

	Crystal			
	a-Se	**Ge**	**NaCl**	**MgO**
ε_r (LF)	6.4	16.2	5.90	9.83
n (~1-5 μm)	2.45	4.0	1.54	1.71

Question 3:
Optical fibers for long-haul applications usually have a core region that has a diameter of about 10 μm and the whole fiber would be about 125 μm in diameter. The core and cladding refractive indices, n_1 and n_2, respectively, are normally only 0.3-0.4 percent different. Consider a fiber with n_1 (core) = 1.4510 and n_2 (cladding) = 1.4477, both at 1550 nm. What is the maximum angle that a light ray can take with the fiber axis if it is still to propagate along the fiber?