1. Suppose light in air is incident upon metal having a complex index of refraction $\tilde{n} = 3 + 5i$. Numerically compute a plot of the reflectances $R_x$ and $R_y$ vs. the angle of incidence $\theta_1$ between $0^\circ$ and $90^\circ$. (Hint: find a program that can handle complex numbers, and have it evaluate the Fresnel equations for you.)

2. Saleh and Teich Problem 6.2-2, page 236.


4. Saleh and Teich Problem 6.3-1, page 236.

5. (3 pts) Consider a plane wave incident on a uniaxial medium with indices $n_o$ and $n_e$, as illustrated below. The angle of incidence is $\theta_1$, and the optic axis of the medium is tangent to the surface and in the plane of incidence.
   (a) Calculate the refraction angle $\theta_2$ for both TE and TM polarizations. (Note that $\theta_2$ here is not the angle between the refracted wave and the optic axis!)
   (b) In general, the Poynting vector $\mathbf{S}$ is not parallel to $\mathbf{k}$ in an anisotropic medium. In class we found the angle of $\mathbf{S}$ to satisfy
   $$\tan \alpha = \frac{n_e^2}{n_o^2} \tan \theta_2$$
   for TM polarization. If $\theta_1 = 30^\circ$ and the medium is calcite with $n_o = 1.66$ and $n_e = 1.49$, evaluate $\theta_2$ and $\alpha$ for both polarizations.