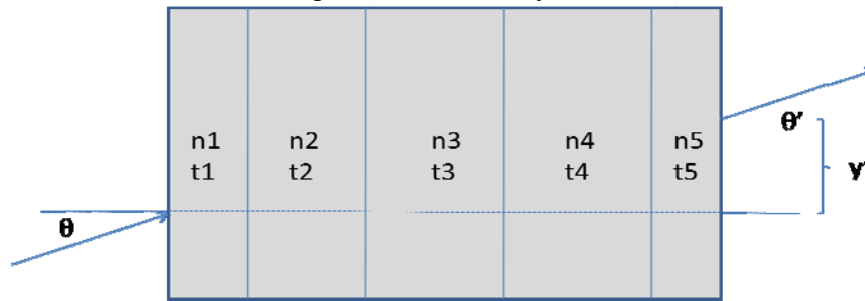


**Homework 10**

Due Friday, April 25- Noon, 2008

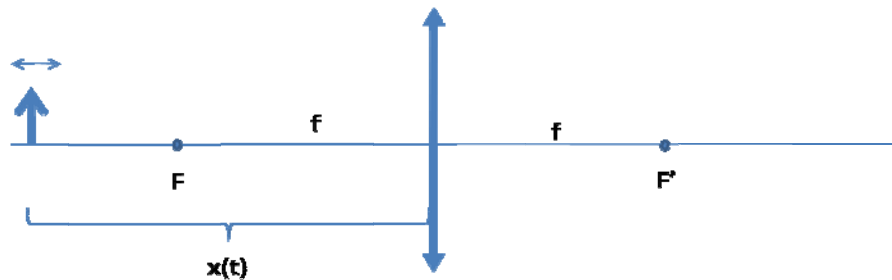
Drop Box #8 Everitt Basement

1. Use Fermat's principle to prove Snell's law (20%)
2. A light beam is incident at an angle  $\theta$  on a multilayer structure, in air (see figure below).



The refractive index and thickness of each layer are  $n_i$ ,  $t_i$ , respectively. Calculate the exit angle  $\theta'$  and the relative elevation  $y'$ . (30%)

3. An object is placed in front of a thin lens of focal distance  $f$ , as shown below.



The position of the object oscillates as  $x(t) = x_0 + \Delta x e^{-i\omega t}$ . Calculate the position of the image as a function of time. Discuss the result. (30%)

4. Use any resources available to you to solve the puzzle online at:

<http://web.mit.edu/newsoffice/2006/FamousOpticsPeople.html>

Print the filled-out version and attach.

(20%).