Physics 108 Homework Assignment#3 (due on 4/20/15 and 5/12/15)

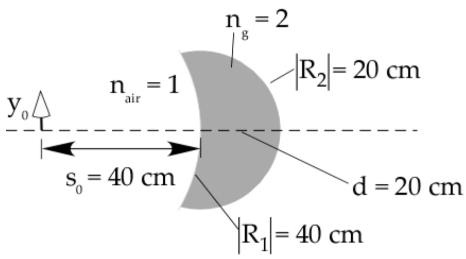
Reading materials:

Pedrotti 3rd Edition: **Chapter 18**: 18-1 through 18-10
Lecture Notes: pp. 24-33

Homework: (Pedrotti 3rd Edition)

From Pedrotti 3rd Edition Chapter 5 and Chapter 18

1. (**Optional for extra point**) Derive refraction matrix and translation matrix yourself
2. (**Optional for extra point**) Derive the reflection matrix using same convention.
3. A *thick* double meniscus lens in air is used to image an object placed at a distance s_0 = 40 cm in front of the lens



(a) *Using the refraction equation* $n_1/s_o + n_2/s_i = (n_2 - n_1)/R$ and treating the lens as two spherical surfaces separated by 20 cm, find the location and the linear magnification of the image after refraction at the second surface; (b) Find the ABCD matrix for this lens; (c) Using the ABCD matrix, find the location after the second surface; (d) Using the ABCD matrix, find the linear magnification of the image.

4. 18-9
5. 18-12
6. 18-14
7. 4-11 (Math review)
8. 4-12 (Math review)
9. 4-13 (Math review)
10. 5-4 (Math review)

11. (**Due 5/11/15**) ***Landscape Lens***: Perform the Introductory Exercise on Landscape Lens using OSLOEDU software. Show YOUR results by (1) displaying the starting "Surface Data" and "Lens Drawing" for paraxial rays and non-paraxial rays; and (2) displaying your optimized "Surface Data" and "Lens Drawing" for paraxial rays and non-paraxial rays. (You may also try the following condition for start: and "draw off").

SRF	RADIUS	THICKNESS	APERTURE RADIUS	GLASS	SPE
OBJ	--	1.6000e+03	582.352375	AIR	*
1	21.807957 V	4.000000	11.666830 S	BK7 C	
2	27.777778	12.647480 V	9.997114 S	AIR	
AST	--	155.058604 S	4.341641 AS	AIR	*
IMS	--	--	67.000000		*

12. (**Due 5/11/15**) 18-23 Use the lens specifications and OSLOEDU to (a) find the focal length of Proctor photographic lens and (b) find the ABCD matrix for such a lens.