1. An equilateral prism of dense barium crown glass is used in a spectroscope. Its refractive index varies as follows:

Nm	n
656.3	1.63461
587.6	1.63810
486.1	1.64611

   - Determine the minimum angle of deviation for sodium light of 589.3 nm.
   - Determine the dispersive power of the prism.
   - Determine the first two Cauchy constants in the long wave region and from this determine the dispersion of the prism at 653.6 nm.
   - Determine the minimum base of the prism if it is to resolve the hydrogen doublet at 656.2716 and 656.2852 nm.

2. Find the system matrix for a "Cooke" triplet camera lens. Light entering the lens encounters six spherical refracting surfaces, $r_1 \rightarrow r_6$. The thicknesses of the three lenses are $t_1 \rightarrow t_3$. The refractive indices of the three lenses are $n_1 \rightarrow n_3$. The separation between the lenses is d_1 and d_2. Sketch the lens system with its cardinal points. How far behind the last surface must the film plane be in order to focus paraxial rays?

   - r_1 = 19.4mm
   - r_2 = -128.3mm
   - r_3 = -57.8mm
   - r_4 = 18.9mm
   - r_5 = 311.3mm
   - r_6 = -66.4mm

   t_1 = 4.29mm
   t_2 = 0.93mm
   t_3 = 3.03mm

   d_1 = 1.63mm
   d_2 = 12.90mm

   n_1 = 1.6110
   n_2 = 1.5744
   n_3 = 1.6110

3. An optical system, centered on an optical axis, consists of:

   - Source plane
   - Thin lens L_1 40 cm from the source plane (f = 40/3, d = 2 cm)
   - Aperture A 60 cm from the source plane (d = 0.5 cm)
   - Thin lens L_2 70 cm from the source plane (f = 20/3 cm, d = 2 cm)
   - Image plane

   Sketch the system. Locate the image plane, the aperture stop, entrance pupil, exit pupil, field stop, entrance window, exit window and determine the angular field of view.

4. Create a spreadsheet and plot of the curve of total deviation angle versus entrance angle for a prism of apex angle 60^0 and refractive index 1.52.