Physics 208 **OPTICAL INSTRUMENTS HOMEWORK** **Fall 2003**

1) A camera with a 50 mm focal length lens is used to take a picture of a person 170 cm tall. How far from the camera should the person stand so that the image on the film is 24 mm high?

2) Find the required focal length of the eye for object distances of 3 m and 30 cm. Assume that distance from the lens to the retina is 25 mm.

3) A farsighted person needs lenses with a focal length of 50 cm in order to read a book at 25 cm. What is the person's near point without the lenses?

4) A nearsighted person cannot focus clearly on objects more distant than 125 cm. (a) What lenses would be required for the person to see distant objects clearly? (b) If the person's near point is 15 cm without the lenses, what will it be with the lenses in place?

5) A person whose near point is 25 cm is using a 5 cm focal length lens as a magnifying glass. Find the magnifying power of the lens when: (a) the virtual image is at infinity; (b) the virtual image is at the persons near point.

6) (a) Repeat problem 5(a) for a person whose near point is 50 cm. How does the magnifying power compare for the two individuals? (b) Compare the size of the image on the retina when the two people look at the same object with the magnifying glass.

7) A microscope has an objective lens of focal length 1.0 cm and forms a real image 16 cm from the objective. Find the magnifying power of the microscope for a person whose near point is 25 cm if the eyepiece focal length is 3 cm.

8) As seen from the earth, the moon subtends an angle of about 0.01 radians. Determine the following quantities if the moon is viewed through a simple telescope having a 100 cm objective lens and a 3 cm eyepiece lens: (a) the magnifying power of the telescope; (b) the diameter of the image formed by the objective; (c) the angle subtended by the final image when the telescope is focussed to place that image at infinity.