6.) “7x50” binoculars magnify angles by a factor of 7.0, and their objective lenses have an aperture of 50 mm diameter.

(a) According to Rayleigh’s criterion, what is the intrinsic angular resolution of these binoculars? Assume that the light have a wavelength of 500 nm.

(b) At best, the pupil of your eye has an aperture of 7.0 mm diameter. Compare the angular resolution of your eye divided by a factor of 7.0 with the intrinsic angular resolution of the binoculars. Which of the two numbers determines the actual angular resolution you can achieve while looking through the binoculars

10.) A Newton’s ring apparatus consists of a lens with one flat surface and one convex surface rests on a flat plate of glass (Fig. 35-45a). A light ray normally incident on the lens will be partially reflected by the curved surface of the lens and partially reflected by the flat plate of glass. The interference between these reflected rays will be constructive or destructive, depending on the height of the air gap between the lens and the plate. The interference gives rise to the pattern of Newton’s rings, shown in Fig. 35-45b.

(a) Why is the center of the pattern dark?

(b) Show that the radius of the *m*th dark ring is

where is the wavelength of the light and *R* is the radius of curvature of the convex surface of the lens.

(c) What is the radius of the first dark ring if = 500 nm and R = 3.0 m?

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| http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif | |  | | --- | | http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif | | |  |  |  | | --- | --- | --- | | |  | | --- | | http://edugen.wileyplus.com/edugen/courses/crs4957/common/art/pixel.gif | | http://edugen.wileyplus.com/edugen/courses/crs4957/halliday9118/halliday9088c35/image_n/nt0047-y.gif  Figure 35.45 (a) & (b) | | | |