

PHYSICS 1020

Homework #8

(Due May 1, 2017)

1. A recent TV commercial for vitamins states that the human eye can detect the light from a single candle at a distance of 10 miles. Calculate the illuminance (in lux) due to a candle at this distance. (*Hint:* The luminous intensity of a candle is 1 candela.)
2. What distance does light travel in vacuum in 1 nanosecond?
3. (KJF 17-8) Light from a sodium lamp ($\lambda = 589 \text{ nm}$) illuminates two narrow slits. The fringe spacing on a screen 150 cm behind the slits is 4.0 mm. What is the spacing (in mm) between the two slits?
4. (KJF 17-30) A 0.50-mm-wide slit is illuminated by light of wavelength 500 nm. What is the width of the central maximum on a screen 2.0 m behind the slit?
5. (KJF 17-33) A 0.50-mm-diameter hole is illuminated by light of wavelength 500 nm. What is the width of the central maximum on a screen 2.0 m behind the slit?
6. Unpolarized light of intensity I_0 passes through two pieces of polarizing material. The first (called the *polarizer*) has its polarization axis in the vertical direction, and the second (called the *analyzer*) has polarization axis 35° from the vertical. What is the intensity of the light emerging from the analyzer, in terms of I_0 ?