

Ch. 4 Pwb. 59

- a) Find the angle between 2 resolvable points for the eye where $D = 3.00 \text{ mm}$

$$\lambda = 550 \text{ nm}$$

$$\theta = 1.22 \frac{\lambda}{D} = 1.22 \left(\frac{550 \times 10^{-9} \text{ m}}{3.0 \times 10^{-3} \text{ m}} \right)$$

$$\theta = 2.24 \times 10^{-4} \text{ rad}$$

- b) How far is a car when you can just resolve the 2 head lights?

$$s = 1.30 \text{ m}$$



$$s = r \cdot \theta \rightarrow r = \frac{s}{\theta} = \frac{1.30 \text{ m}}{2.24 \times 10^{-4} \text{ rad}}$$

$$r = 5.80 \times 10^3 \text{ m} = \boxed{5.8 \text{ km}}$$

- c) Resolve points at arms length

$$r = 0.800 \text{ m}$$

$$s = r \cdot \theta = (0.800 \text{ m})(2.24 \times 10^{-4} \text{ rad}) = 1.8 \times 10^{-4} \text{ m} = \boxed{0.18 \text{ mm}}$$

- d) Usually we read at closer than arms length. Therefore, the dots per inch when printing must be higher. Usually 300 dpi is sufficient. A retinal display on a phone needs to match this or better