Practical 10 Questions

1. You are driving east on a straight highway at night, with the pupils of your eyes dilated to a diameter of 6.0 mm. Far down the road, you spot a lone car traveling west toward you, and the headlights on this car are 1.5 m apart. Assuming diffraction is the only factor limiting your vision, how far away is the approaching car when you start seeing its headlights as two separate objects?

2. Electrons moving at 2.0×10^6 m/s pass through a double-slit apparatus, producing an interference pattern in which adjacent bright fringes are separated by 1.5 mm.

   (a) What is the bright fringe spacing when the electrons are replaced by neutrons moving at the same speed?

   (b) Can visible light be used with this apparatus to produce the same interference pattern as the electrons or neutrons?