

1. A beam of coherent light is split into two beams, beam 1 and beam 2. Beam 1 travels a distance D_1 in arriving at point P and beam 2 travels a shorter distance D_2 in arriving at the same point. If these two beams undergo complete destructive interference at P, the path difference $D_1 - D_2$ must fulfill what condition with respect of the light wavelength?
2. A droplet of oil is deposited on a still lake. Viewing it directly from above, it looks primarily green. As the oil spreads out and the layer becomes thinner, does the color initially shift toward the shorter wavelength, blue end of the spectrum, or the longer wavelength, red end of the visible spectrum? Assume that the refractive index of water is greater than that of the oil. Explain your answer.
3. The first-order bright fringe appears 0.350 cm from the centerline when a light is passed through a double-slit apparatus. The distance between the centers of the slits is 0.450 mm and the screen is 2.71 m from the pair of slits. Find the wavelength of the light.
4. A thin coating is applied to a transparent plate. When viewed directly from above in white light, a single color of reflected light is visible. The coating has thickness 1.23×10^{-7} m and index of refraction of 1.35. (a) Is the index of refraction of the transparent plate greater than or less than the index of the coating? (b) What is the wavelength of the reflected light? (Visible light has wavelengths in the range 400-700 nm.)