Homework Problem 8 – Due March 28

Chapter 29

Q1

Why do radio waves diffract around buildings (so you can listen to your radio without direct "line-of-sight" view of the radio station antenna), while visible light waves do not (at least not appreciably – hence you can't see something that's not in your "line-of-sight")?

Q2

A blue laser and a red laser both impinge on the same double slit. Both produce a visible pattern of dark and bright fringes. Which fringes appear spaced farther apart, the red ones or the blue ones? Explain!

Q3

When the reflected path from the far surface of a thin film is exactly one full wavelength different in distance from the reflected path from the near surface of the same film, will you see an enhancement (constructive interference) or an extinction (destructive interference) of light of that wavelength being reflected from that thin film (assume no phase jumps)?

Q4

Light emitted by sodium atoms is composed of two very close-by wavelengths (588.9950 and 589.5924 nm) that both appear as yellow to the human eye. A high-precision diffraction grating can separate those lines and make them visible. If you have sodium light impinging perpendicularly onto this diffraction grating, where would you have to look (on a screen) to see the 2 lines – directly straight ahead along the original direction of the light, or off to one side? Explain!

Q5

Rainbows, soap bubbles and flower petals all can convert white light (e.g., from the sun) into color. Explain (briefly!) what mechanism is behind each of these 3 cases (they are all different!)