Homework for Fleet Week 6
WAVES
10/10/2001

1) Following what was done in class for refraction, use Fermat s Principle to derive the law of reflection.

2) How is a point in a bay similar to a lens? Sketch oceanic wavefronts approaching a point of land.

3) a. Why do colors appear in soap bubbles and on puddles of water with floating oil?

   b. What is the thickness of a bubble which appears green? Assume the wavelength of green light is 530nm, and the bubble index of refraction is 1.5.

4) Fun with your CDs:

   a. Why do lines of colors appear on a CD? What does the orientation of the colors tell you about the orientation of the grooves? I.e., are the grooves on a CD circular or radial?

   b. Given the fact that visible light (~500nm) is diffracted from a CD, and assuming the spacing for each storage site along a groove is about the same as the spacing between adjacent grooves, try to come up with an order of magnitude estimate of the storage capacity of a CD. Assume one byte can be stored on each site. In other words, how many storage sites are on a typical CD?
   (Hint: Assume the spacing between grooves is λ, and assume a CD is a square instead of circular).