Physics 216: HW 4 Hand-in problems

1) Looking down at a puddle you see a rainbow-colored pattern in the reflection. Remembering your physics 216 you realize that it is thin film interference of some material floating on the water. If the material is gasoline (n=1.40) what is the minimum thickness of the layer needed to observe constructive interference at 589 nm when looking straight down? Note: water has n-1.33.
2) A CD or DVD is a digital storage medium that works with light to read the data. The layout of the "tracks" on the disc are narrow, closely spaced circular grooves. To investigate the spacing of the grooves you shine red light (λ=650 nm) on the disc at normal incidence. You observe a bright maximum reflected back at 30 degrees from the incident direction of the light. What is the spacing of the tracks on the disc?
3) Since there is always an accompanying single slit diffraction pattern with a double slit interference pattern, you can run into the situation where one of the maxima from the 2 slit interference is expected where the first minimum of the single slit patter lands. This results in a "missing" 2 slit fringe.
    a) Does the "missing" fringe phenomenon depend on the wavelength of the light or is it "missing" for all wavelengths? Explain.
    b) If the 5^{th} fringe is missing, determine the ratio of the slit spacing to slit width?