Remember to write any pre-lab notes, like instructions, in your notebook on the left-hand page. Required elements, like your description of the work you did, goes on the right-hand page.

1. You are supposed to make “Acidic BCG” and “Basic BCG” by diluting 0.50 M AcOH and 0.50 M AcONa. What will the concentrations of AcOH and AcONa be in these stock solutions, respectively? (We only need a rough estimate of these concentrations, so assume no acid-base chemistry happens during dilution, i.e., the only thing that affects concentration is dilution.)

2. Wikipedia lists the pKₐ of acetic acid at 25 °C as 4.76. Assuming this is a good value for our sample solutions,¹ use the H-H equation to estimate the pH of two sample solutions (see lab manual for composition of solutions):
   a. Solution 2
   b. Solution 7

3. The lab manual describes how to prepare the solution for measuring Aₐ. Assuming that [H₃O⁺] and [Cl⁻] are identical, what is the solution’s pH? (Assume 40 mini-drops equals 1 mL)

4. The background section explains how to obtain the ratio [A⁻]/[HA] using three absorbance measurements. This procedure may not be trustworthy for samples that produce “high” absorbance measurements because so little light is transmitted by the sample. To put it another way, your spectrophotometer might be unable to distinguish reliably between absorbance measurements of 1.5 and 2.0 because these correspond to only 3% and 1% transmission, respectively.² Suppose you have determined that Aₐ = 0, Aₐ = 2 for some system and you are unwilling to trust absorbance measurements of >1.5 as being reliably different from Aₐ:
   a. Under these conditions, what is the largest value for [A⁻]/[HA] that can be measured reliably?
   b. How many pH units away from the pKₐ of HA would you find this ratio?

¹ pKₐ values vary with temperature, total acid concentration, and the presence of other salts (ionic strength). The Wikipedia value mentions only temperature.
² Note: A = – log₁₀(Iₒ/Iₑ) where Iₒ is the intensity of the light beam striking your sample and Iₑ is the intensity of the light beam emerging from your sample. See http://en.wikipedia.org/wiki/Beer-Lambert_law