EE 322 Advanced Analog Electronics, Spring 2012
Homework #10 solution

1. Do H&H Exercise 9.5 in the body of the text.

2. Design a PLL for FM radio demodulation. Follow the example in H&H Figure 9.72 and accompanying text. Use a VCO with gain $100\,\text{MHz/V}$, and use a loop filter bandwidth of $20\,\text{kHz}$ (to capture audio up to that frequency). Use a XOR phase detector. The carrier frequency is $90\,\text{MHz}$.

   (a) What should be the values of the components of the LP filter?

   (b) Explain how the frequency and amplitude of the audio signal are encoded on the FM carrier.

   (c) Where do you measure the output demodulated audio signal?

   (d) If the FM band is $50\,\text{kHz}$ wide, what is the largest amplitude of the demodulated signal?

   (e) If you need a maximum amplitude of $20\,\text{V}$ to drive the audio speakers, what gain should you apply to the output signal?

   (f) Design the circuit, including values for components, which will couple the demodulated signal to make a AC signal of maximum amplitude of $20\,\text{V}$ to drive the speakers.