Razavi 11.4 c and d. Assume that the transistors are biased so that \( I_d=10\mu A, V_{dsat}=200\text{mV}, \lambda=1/(10\text{V}) \). \( C_L=100\text{fF} \).

Razavi 11.\{6, 33, 42, 57\}

**Problem 3**

**A)** Plot the magnitude of the impedance of a 100\(\mu\)H inductor with 1 Ohm wire resistance over the frequency range from 1 to 100 Mrad/sec. On the same plot, plot the magnitude of the impedance of a 100pF capacitor (and the result from 4B below). (as with all such plots, use log/log axes)

**B)** If you connect the inductor and capacitor in parallel to form an LC tank, what is the resonant frequency in radians/sec and Hz?

**C)** What is the impedance of the inductor at the resonant frequency of the tank? What is the impedance of the capacitor at the resonant frequency of the tank?

**D)** What is the Q of the inductor (the impedance at resonant frequency divided by the wire resistance)?

**Problem 4:**

**A)** Write an expression for the complex impedance of an LC tank with a resistor in series with the inductor. What is the magnitude of the impedance of the tank at resonance?

**B)** Assuming \( L=100\mu\)H, \( R=1\)Ohm, and \( C=100\)pF, what is the magnitude and phase of the tank impedance at resonance? Add this point to your plot for problem 3A.

**C)** Use spice to plot the magnitude and phase of the impedance of the LC tank in part B. Compare to your hand drawing in problem 1A.