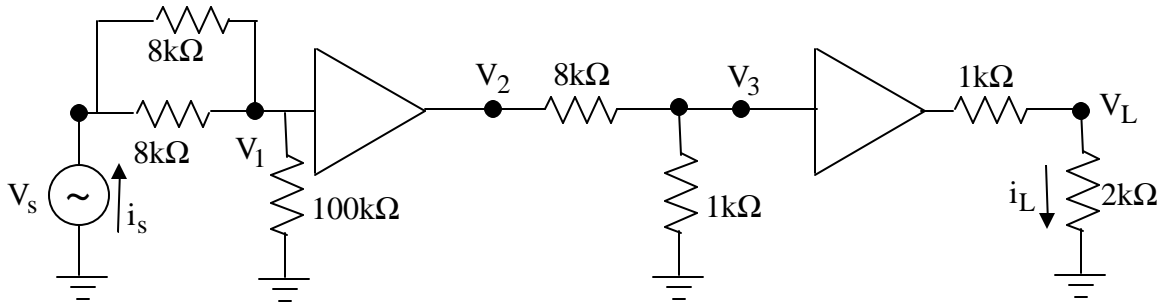
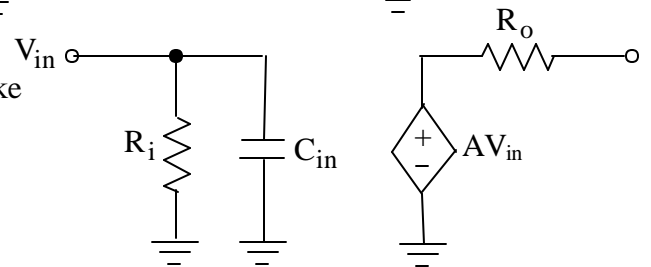


1. V_s is an AC signal. Both amplifiers have the following characteristics:

$A_{vo}=10$; $R_i=100k\Omega$; $R_o=10k\Omega$, Clipping levels: $L=\pm 12V$ (unloaded)

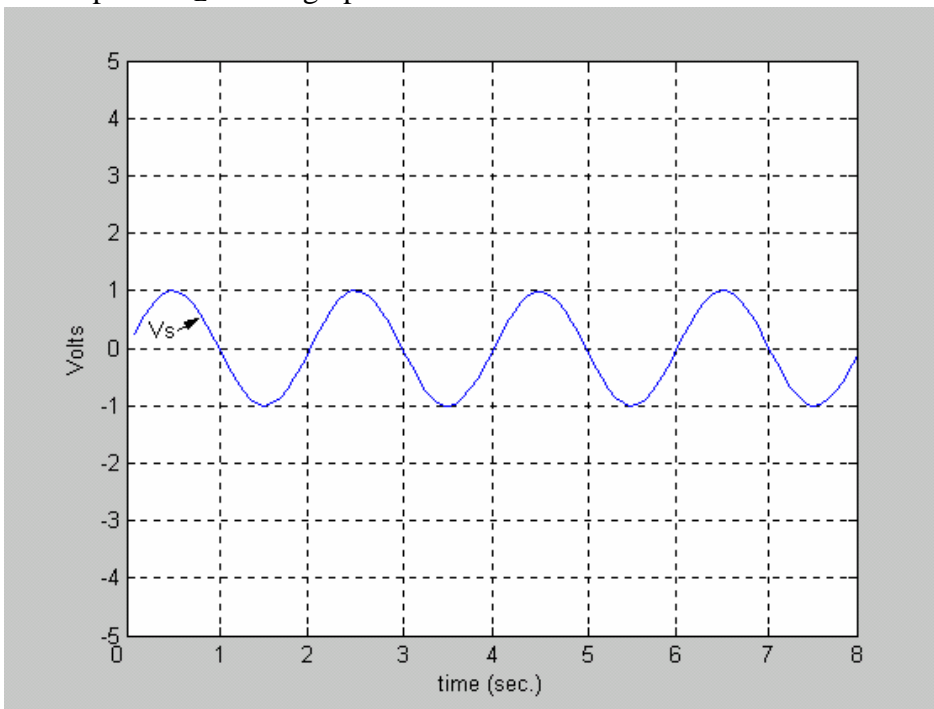


Draw this 2 stage amplifier using the model at the right. Make sure to label V_s , V_1 , V_3 , and V_L on the schematic. $C_{in}=5pF$. Find V_L/V_s frequency response transfer function.

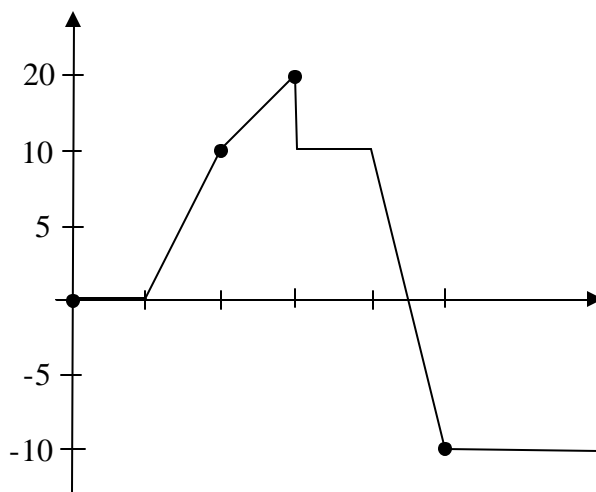
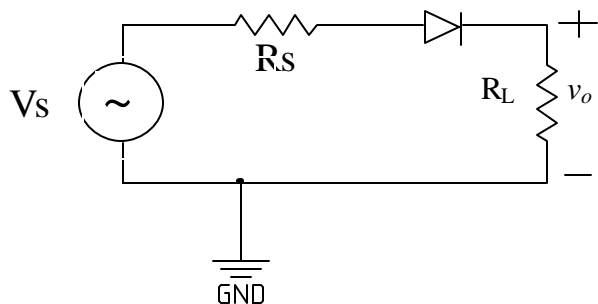


2. Sketch the Bode plots using a straight line approximation of the transfer function found in #1 circuit.

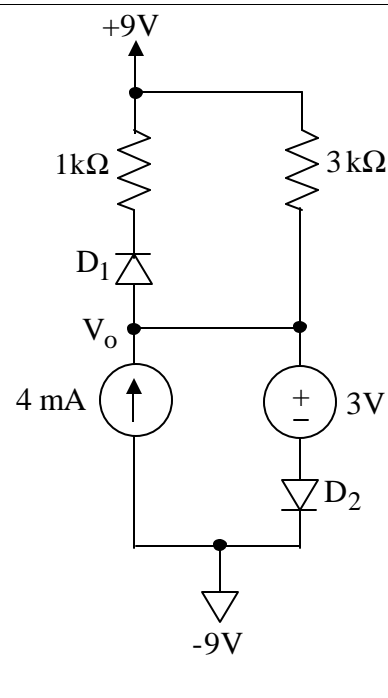
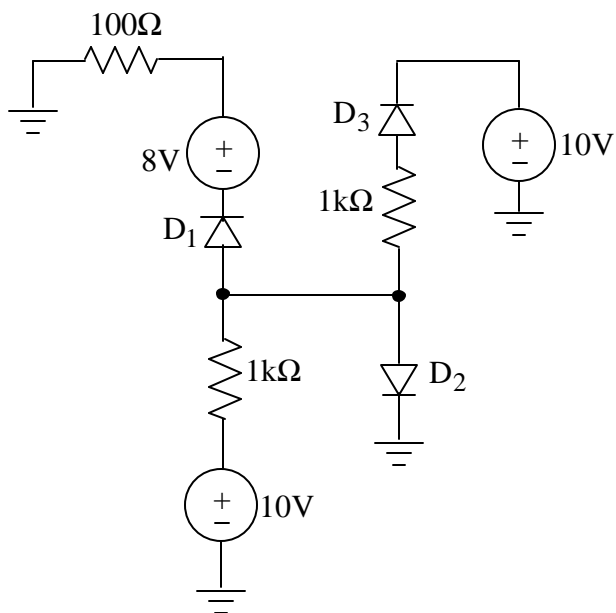
3. (a) What is the overall gain for the circuit in #1 in V/V and in dB.
- (b) Find $A_i = \frac{i_L}{i_s}$. Express your answer as a ratio(A/A) and in dB.
- (c) What is the exact frequency in Hz for the f_{dB} point. (solve with the equation)
- (d) For the input V_s as shown, sketch (make the peaks exact and estimate between the peaks) the output at V_L on the graph below.



4. Assume the diode is ideal. Let $R_s = 1\text{k}\Omega$, $R_L = 4\text{k}\Omega$. Sketch and clearly label the output voltage v_o . V_s is shown in the graph below.



5. Use the constant voltage drop diode model with $V_{D0} = 0.7$ to solve the circuits below for all currents in all branches of the circuit and V_o . Verify your answers.



6. Assume all diodes are identical in the above circuit and have $V_{D0} = 0.6\text{V}$, $n = 2$, and $V_T = 25\text{mV}$. Use the constant voltage drop method. Verify that your assumption for the diode operations (i.e. on or off) are correct. Find the following making sure you find the correct operation of the diodes.

- The current I_{D1} through D1
- The current I_{D2} through D2
- The current I_{D3} through D3

7. For the circuit below, assume $V_{D0}=0.5V$, $n=3$, and $V_T=25mV$. Assume identical diodes and use the constant voltage drop method when appropriate. $V_s=10 + \sin(10kt)$ Volts. (Note: $I_D=0$ diode is still on.)

- a) Determine the **DC** component of the diode currents through all diodes, I_D .
- b) Determine the **DC** component at the output, V_o .
- c) Determine the **AC** component of the diode currents through all diodes, i_d .
- d) Determine the **AC** component at the output, V_o .
- e) What is the **total** output for V_o (Dc and AC).

