

Use the following equation for problem 1 and 2:

$$H(s) = \frac{5,000(s+1,000)}{(s+100)(s+10)}$$

1. (a) Plug in values of ω from 0.1 to 10^5 rad/sec. Plot this graph of dB vs ω . (Convert Volts/Volts to dB)
(b) Sketch the Bode plots using a straight-line approximation (procedures described in class).
2. (a) Use Matlab to obtain the Bode Plot.
(b) Compare the graphs from 1(a), 1(b), and 2(a). What differences do you see?
3. (a) Sketch the Bode plots for the equation below using a straight-line approximation (procedures described in class).
(b) Use Matlab to obtain the Bode Plots.
(c) Compare the two sketches.

$$H(s) = \frac{2,000(s+100)(s+1,000)}{s^2(s+5,000)}$$

4. (a) Sketch the Bode plots for the equation below using a straight-line approximation (procedures described in class).
(b) Use Matlab to obtain the Bode Plots.
(c) Compare the two sketches.

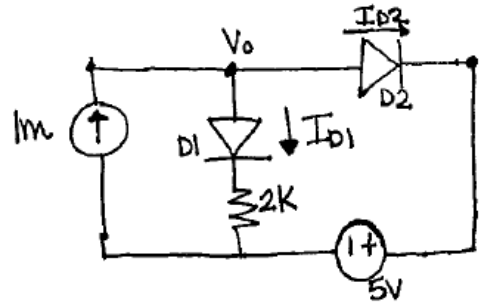
$$H(s) = \frac{1 \times 10^6 s^2}{(s+10)^2 (s+1k)}$$

5. (a) Sketch the Bode plots for the equation below using a straight-line approximation (procedures described in class).
(b) Use Matlab to obtain the Bode Plots.
(c) Compare the two sketches.

$$H(s) = \frac{100k \cdot s}{(s+1)(s+1k)}$$

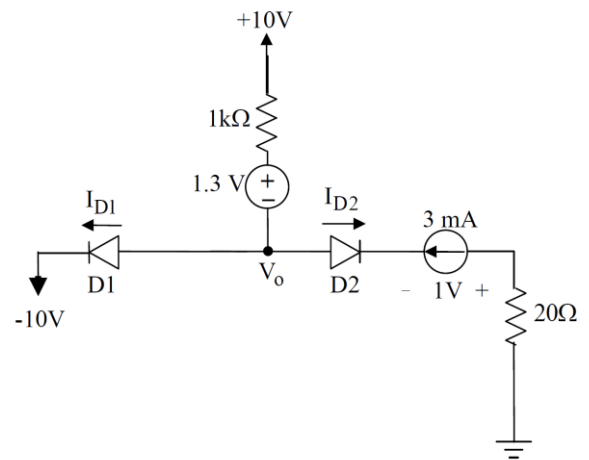
6. Assume all diodes are identical and have $V_{D0}=0.7V$. Use the **constant voltage drop** method. Verify that your assumption for the diode operation(i.e. on or off) are correct. Find the following making sure you find the correct operation of the diodes. Show all of your work.

- State your assumptions (diode is on/off)
- The current I_{D1}
- The current I_{D2}
- The voltage V_o
- Verification to prove your assumptions for the diodes are correct.



7. Assume all diodes are identical and have $V_{D0}=0.7V$, $n=1$, and $V_T=25mV$. Use the constant voltage drop method. Verify that your assumption for the diode operation(i.e. on or off) are correct. Find the following making sure you find the correct operation of the diodes. Note that the current source is NOT ideal and has a 1V voltage drop across it.

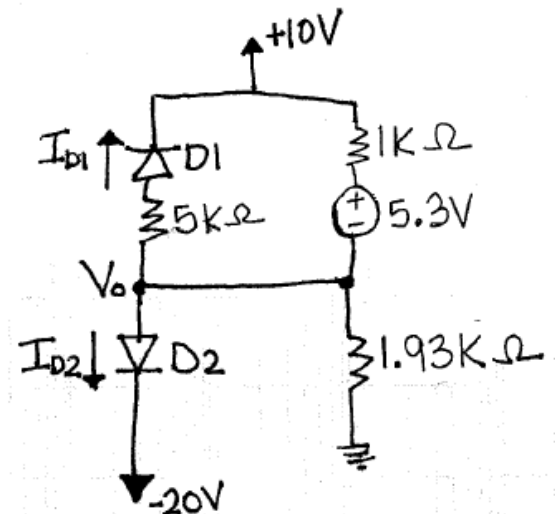
- State your assumptions (diode is on/off).
- The current I_{D1}
- The current I_{D2}
- The voltage V_o
- Your verification to prove your assumptions for the diodes are correct.



- Use the circuit from problem 7: If there is noise on the +10V supply of $\pm 1V$, what is the total value for I_{D1} (the AC current through diode, D1). *{Hint: remember to use the AC model for the diode}*

9. Assume all diodes are identical and have $V_{D0}=0.7V$, $n=5$, and $V_T=25mV$. Use the constant voltage drop method. Verify that your assumption for the diode operation(i.e. on or off) are correct. Find the following making sure you find the correct operation of the diodes.

- State your assumptions (diode is on/off).
- The current I_{D1}
- The current I_{D2}
- The voltage V_o
- Verification to prove your assumptions for the diodes are correct.



- Using the circuit from problem 9. If there is noise on the +10V supply of $\pm 1V$, what is the total value for I_{D2} (the AC current through diode, D2). *{Hint: remember to use the AC model for the diode}*