1

The circuit of Fig. 9-17 is an *adjustable-output voltage regulator*. Assume that the basic op amp is ideal. Regulation of the Zener is preserved if $i_Z \geq 0.1I_Z$ (Section 2.10). (*a*) Find the regulated output v_o in terms of V_Z. (*b*) Given a specific Zener diode and the values of R_S and R_1, over what range of V_S would there be no loss of regulation?

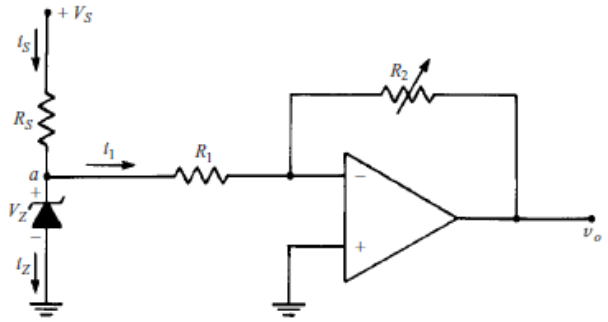


Fig. 9-17

$$v_o = -\frac{R_2}{R_1} V_Z$$

Respostas:

$$0.1I_Z R_S + \left(1 + \frac{R_S}{R_1}\right) V_Z \leq V_S \leq I_Z R_S + \left(1 + \frac{R_S}{R_1}\right) V_Z$$

9.8 In analog signal processing, the need often arises to introduce a *level clamp* (linear amplification to a desired output level or value and then no further increase in output level as the input continues to increase). One level-clamp circuit, shown in Fig. 9-16(*a*), uses series Zener diodes in a negative feedback path. Assuming ideal Zeners and op amp, find the relationship between v_o and v_S. Sketch the results on a transfer characteristic.

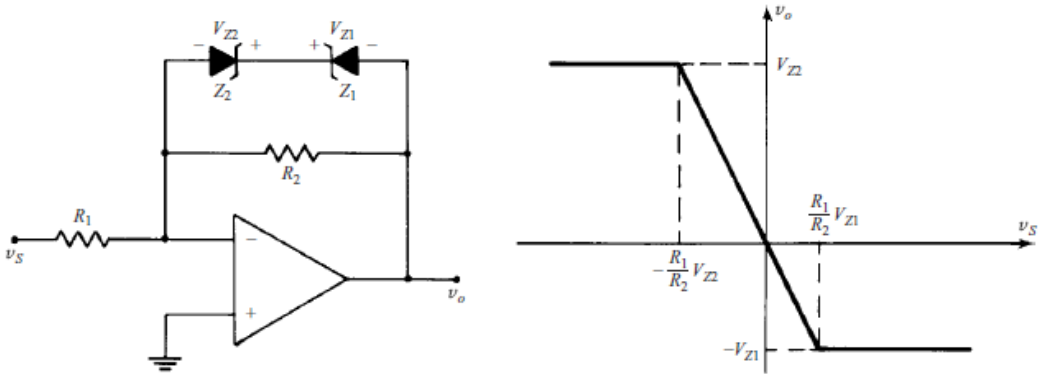
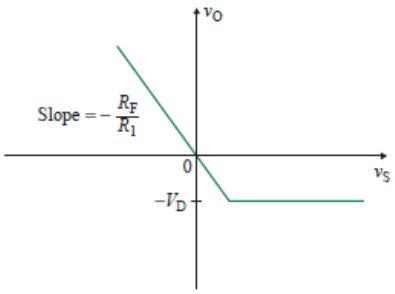


Fig. 9-16

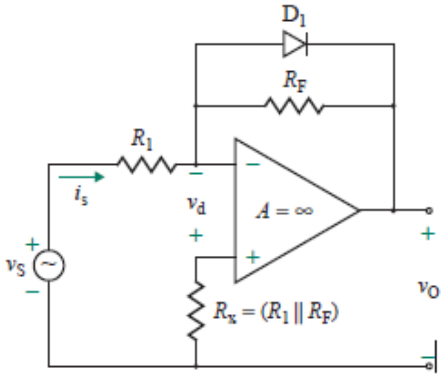
Resultados: grafico acima (b)

$$v_o = \begin{cases} V_{Z2} & \text{for } v_S < -\dfrac{R_1}{R_2} V_{Z2} \\ -\dfrac{R_2}{R_1} v_S & \text{for } -\dfrac{R_1}{R_2} V_{Z2} \le v_S \le \dfrac{R_1}{R_2} V_{Z1} \\ -V_{Z1} & \text{for } v_S > \dfrac{R_1}{R_2} V_{Z1} \end{cases}$$

3. No circuito ao lado esboce a curva (vo) x (vs).



R.



4.

[5.11] Find v_o and i_o in the circuit in Figure 5.5.

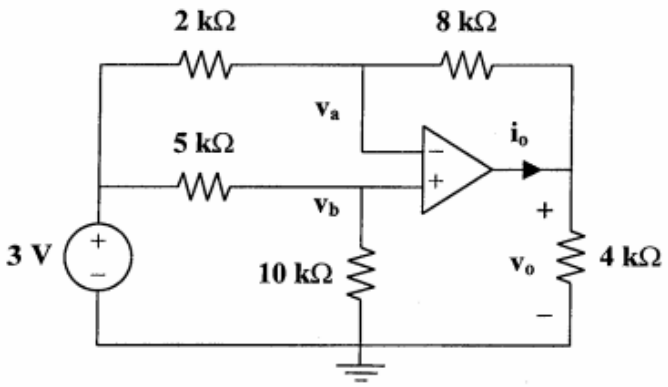


Figure 5.5

R. Vo = -2 V e Io=-1 mA

5.

[5.19] Using the circuit in Figure 5.6, calculate v_o if $v_s = 0$.

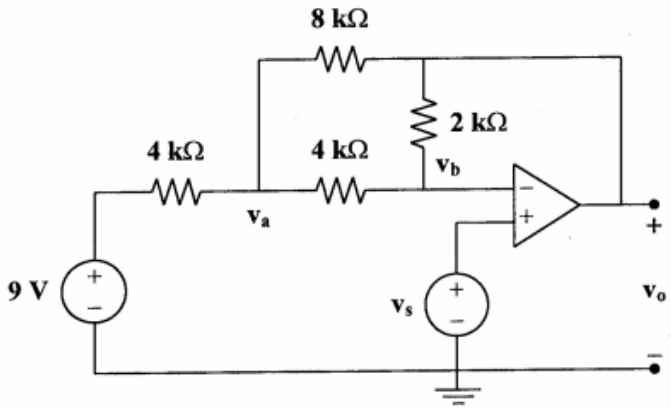


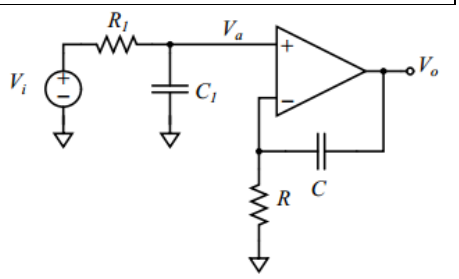
Figure 5.6

R. Vo = -1.63 V

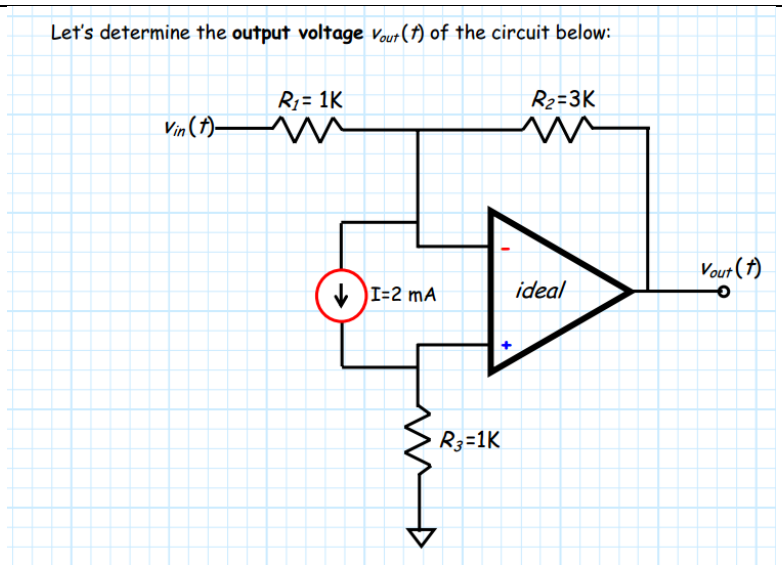
6. Calcule o ganho em tensão do circuito. DICA – Use Laplace para representar os capacitores (1/sC)

R.

$$\frac{V_o(s)}{V_i(s)} = \frac{1}{R_1 C_1 s + 1} \frac{RCs + 1}{RCs}$$



7.



R. Vout = 14 – 3vin