14 Esboce, para o circuito da Figura 10, a forma de onda de saída ($v_{saída}$).

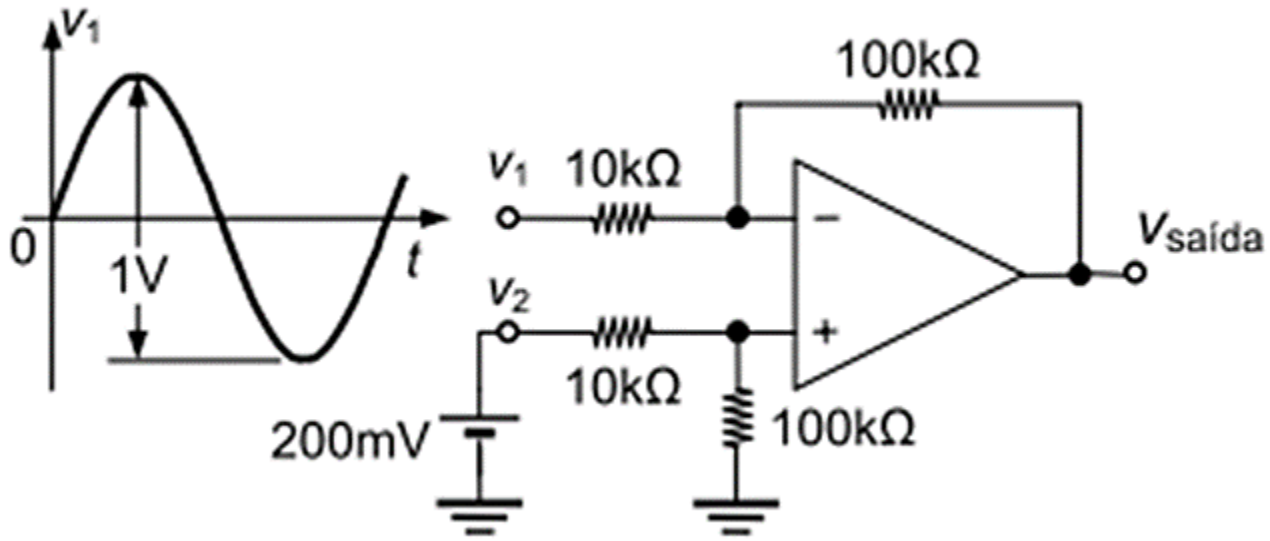
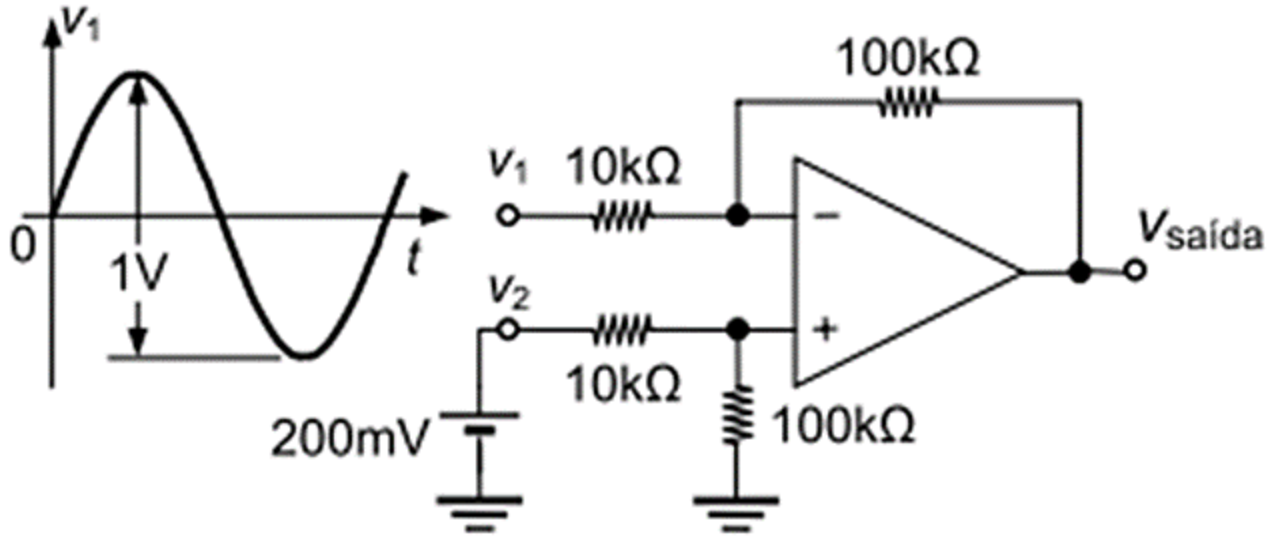
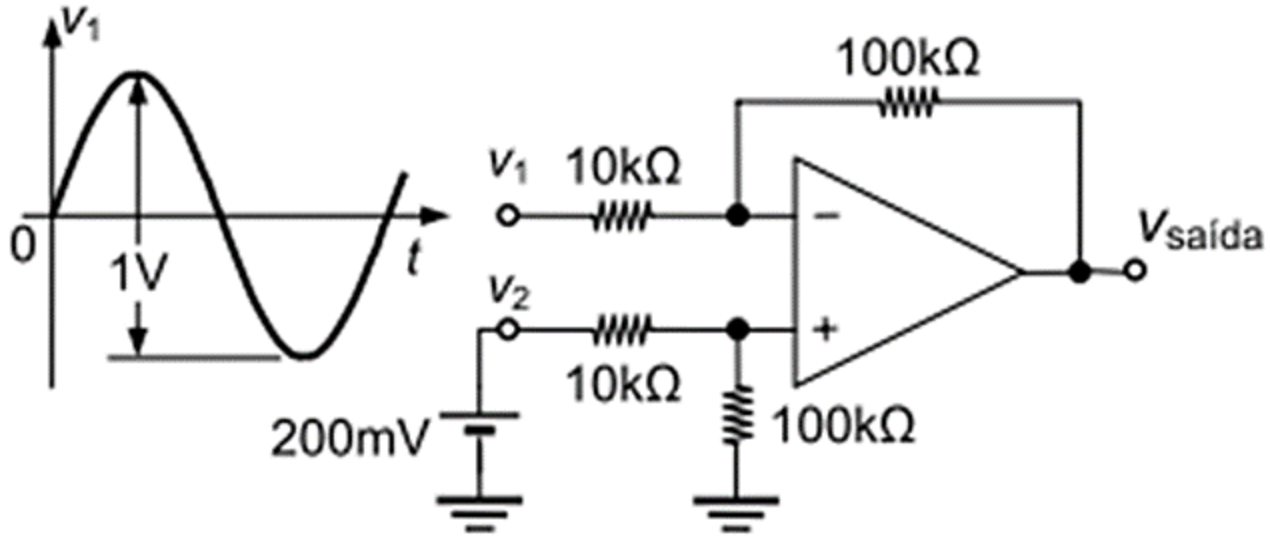


Figura 10



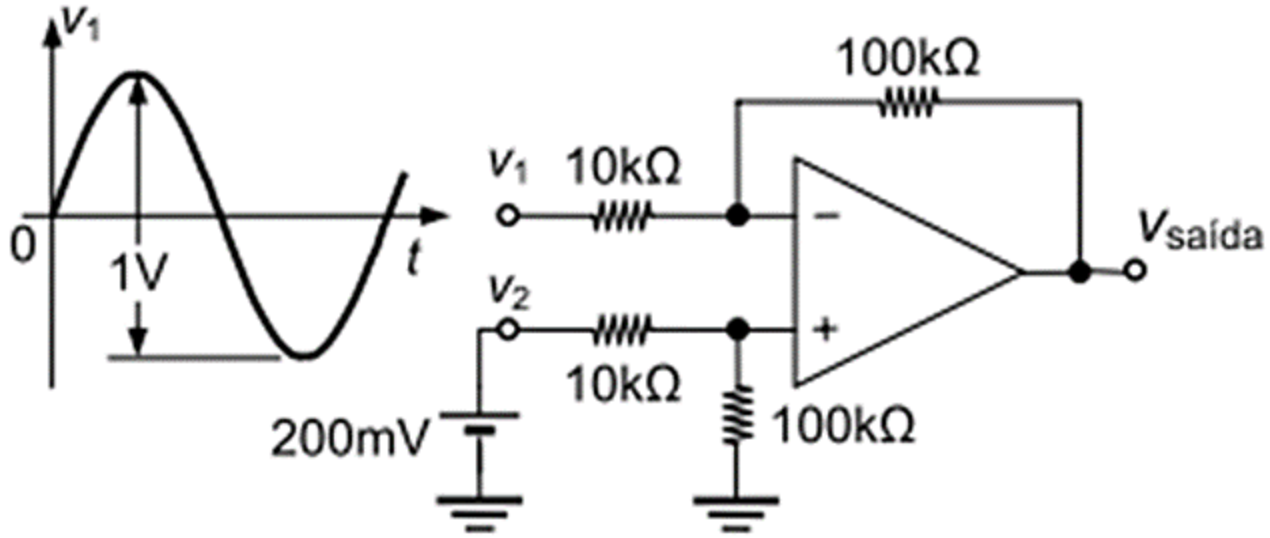
Amplificador diferencial $\rightarrow V_{saída} = \frac{R_2}{R_1}(v_2 - v_1)$



Amplificador diferencial $\rightarrow V_{saída} = \frac{R_2}{R_1}(v_2 - v_1)$

$$v_{saída} = \frac{100\,\text{k}\Omega}{10\,\text{k}\Omega}(0,2\text{V} - 0,5sen(\omega t))$$

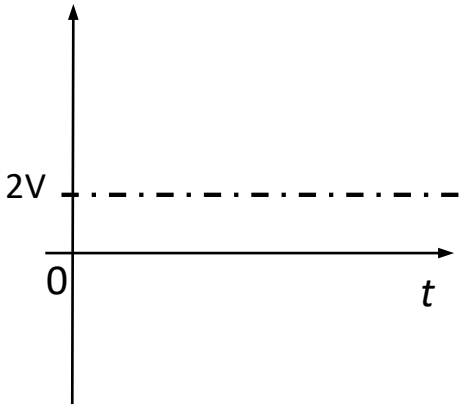
$$= 2 - 5sen(\omega t) \quad (\text{V})$$

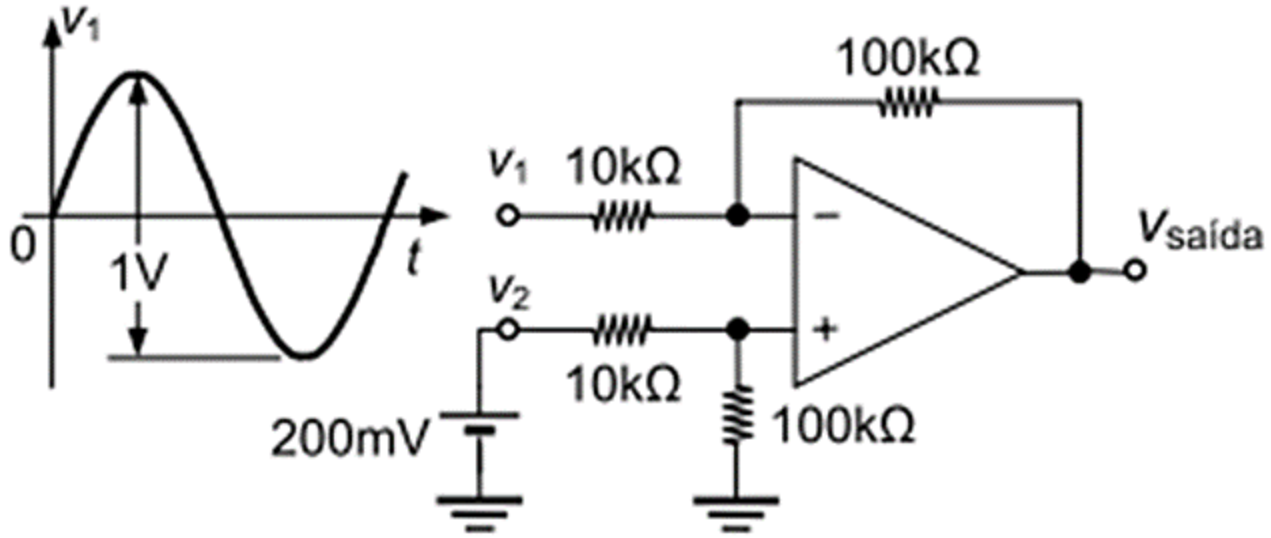


Amplificador diferencial $\rightarrow V_{saída} = \frac{R_2}{R_1}(v_2 - v_1)$

$$v_{saída} = \frac{100\,\text{k}\Omega}{10\,\text{k}\Omega}(0,2\text{V} - 0,5sen(\omega t))$$

$$= 2 - 5sen(\omega t) \quad \text{(V)}$$

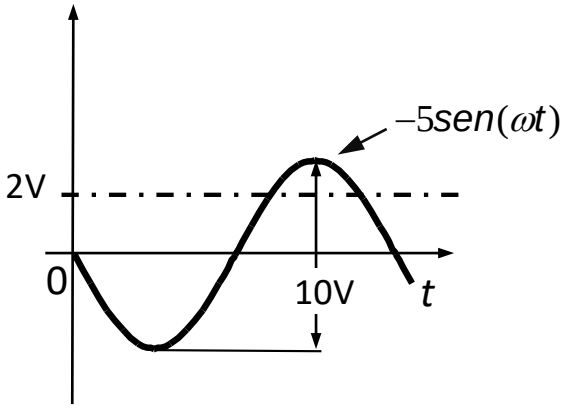


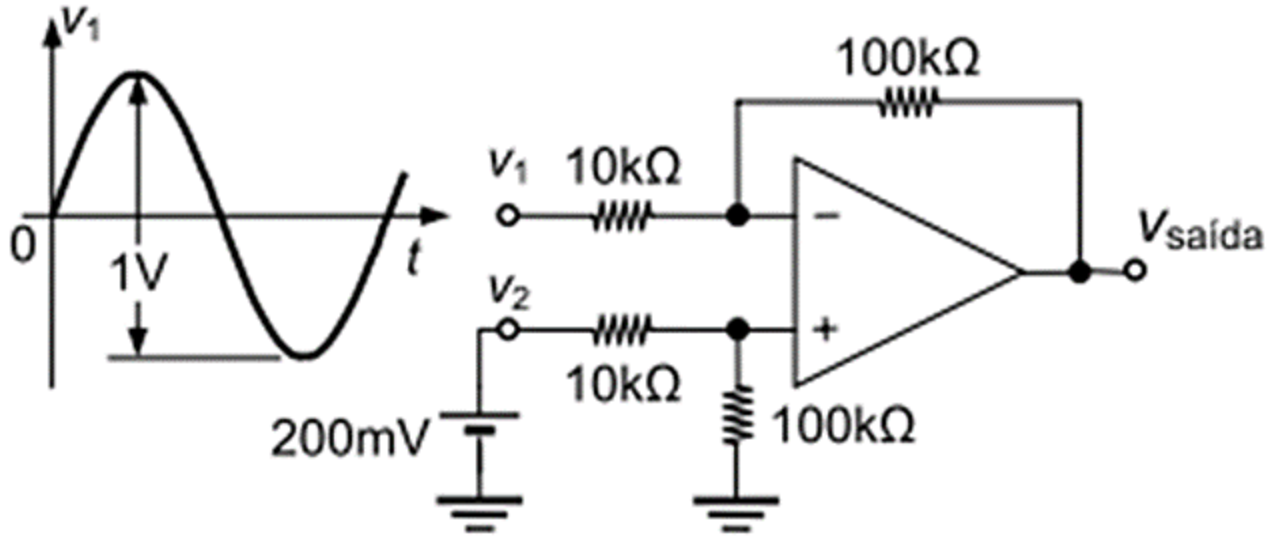


Amplificador diferencial $\rightarrow V_{saída} = \dfrac{R_2}{R_1}(v_2 - v_1)$

$$v_{saída} = \frac{100\,\text{k}\Omega}{10\,\text{k}\Omega}\left(0,2\text{V} - 0,5sen(\omega t)\right)$$

$$= 2 - 5sen(\omega t) \quad \text{(V)}$$

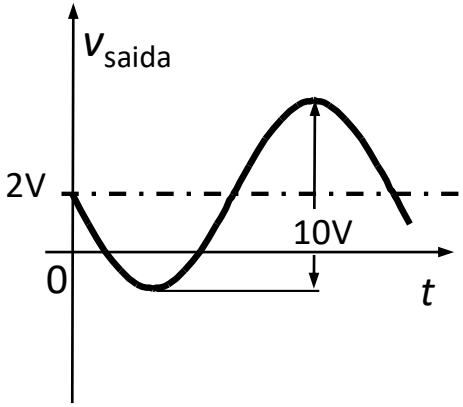




Amplificador diferencial $\rightarrow V_{saída} = \dfrac{R_2}{R_1}(v_2 - v_1)$

$$v_{saída} = \frac{100\,\text{k}\Omega}{10\,\text{k}\Omega}\left(0,2\text{V} - 0,5sen(\omega t)\right)$$

$$= 2 - 5sen(\omega t) \quad \text{(V)}$$



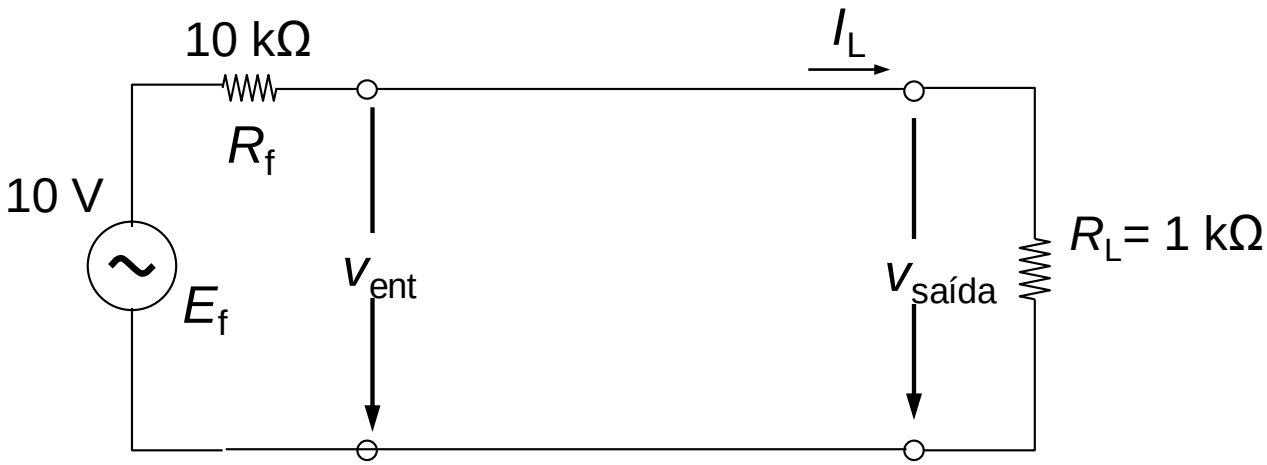
15 Apresente um circuito que, utilizando apenas AmpOP´s e resistências de 10kΩ, implemente a função $v_{saída} = v_3 - v_2 - v_1$.

16 Pretende-se ligar uma fonte de 10 V com uma resistência interna de 10 kΩ a uma carga com uma resistência de 1 kΩ. Diga qual é a tensão que aparece aos terminais da carga se,

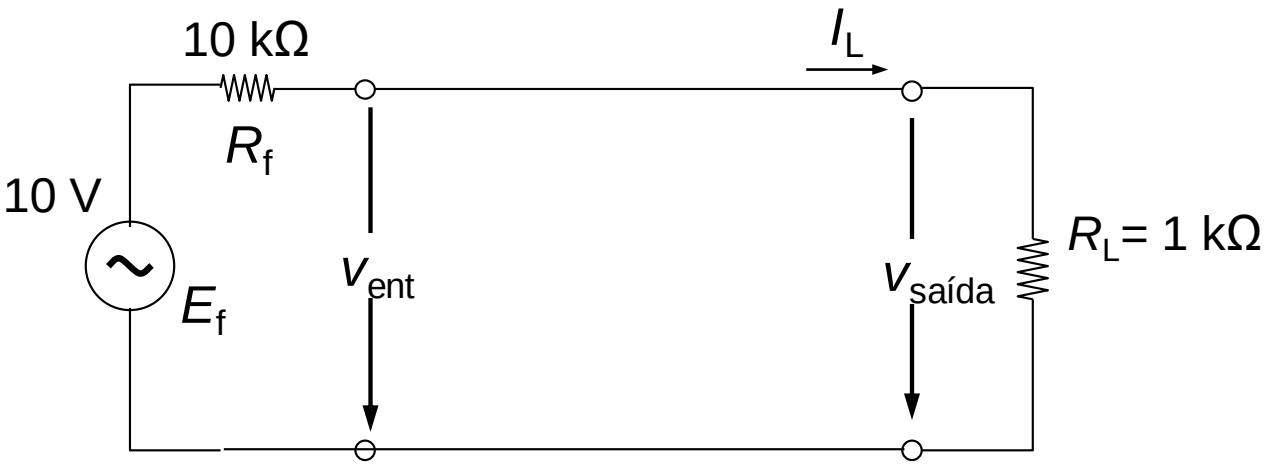
16.1 A carga for ligada directamente à fonte.

16.2 Se um seguidor de tensão for inserido entre a fonte e a carga.

16.3 Para cada caso diga qual é a corrente na carga. De onde vem a corrente da carga no caso de 16.2?


10 kΩ
I_L
R_f
10 V
E_f
v_{ent}
$v_{saída}$
R_L= 1 kΩ

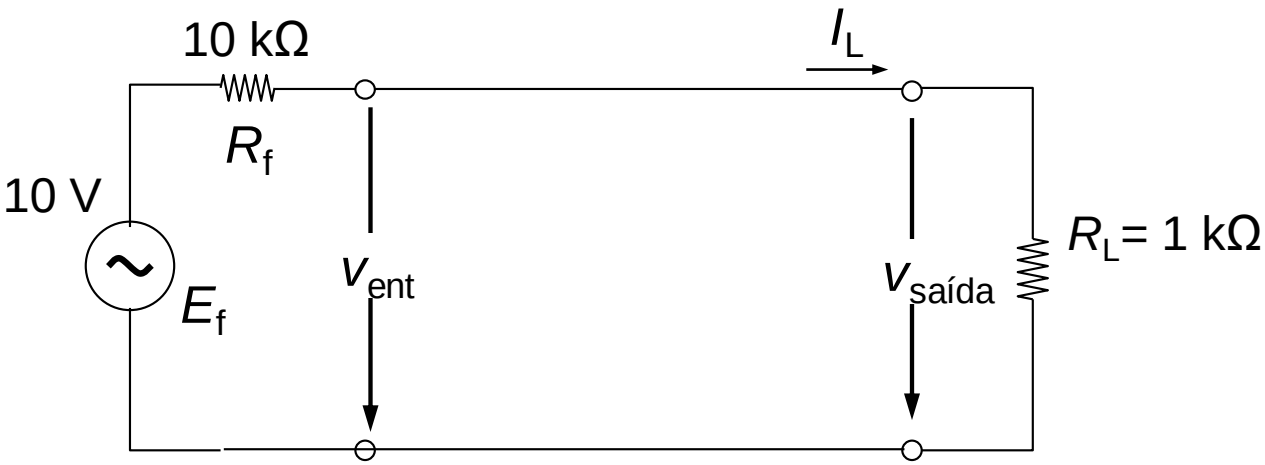
16.1



$$I_L = \frac{10\text{V}}{1\,\text{k}\Omega + 10\,\text{k}\Omega} = 0.909\ \text{mA}$$

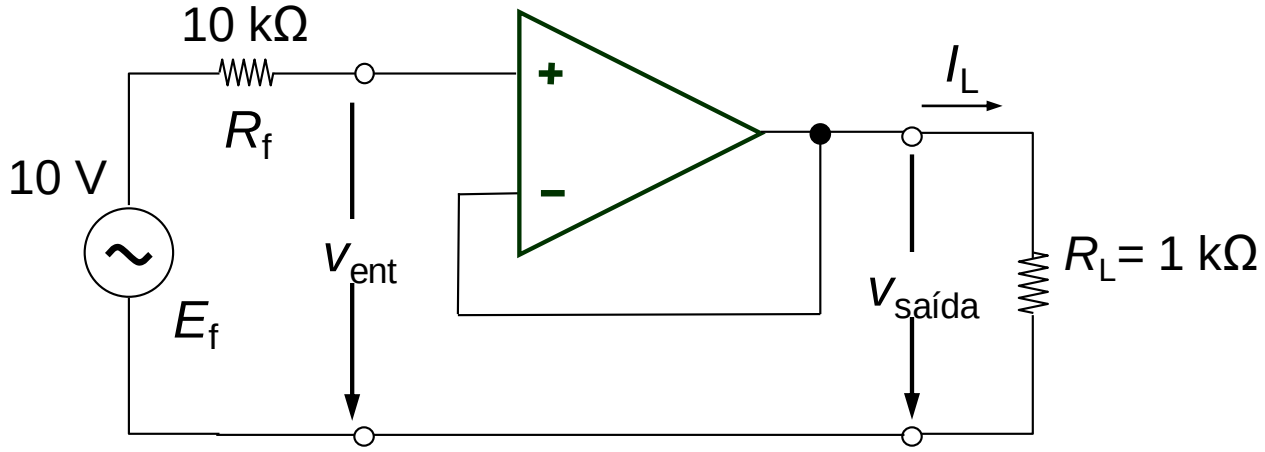
$$v_{saída} = 1\,\text{k}\Omega \times 0.909\ \text{mA} = 0.909\ \text{V}$$

16.1

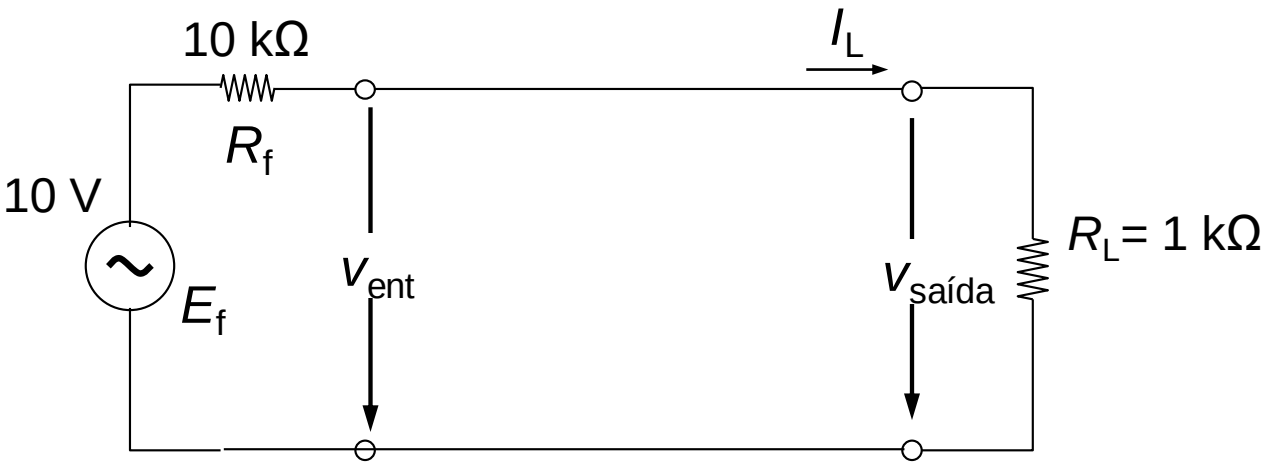


$$I_L = \frac{10\text{V}}{1\,\text{k}\Omega + 10\,\text{k}\Omega} = 0.909\ \text{mA}$$

$$v_{saída} = 1\,\text{k}\Omega \times 0.909\ \text{mA} = 0.909\ \text{V}$$



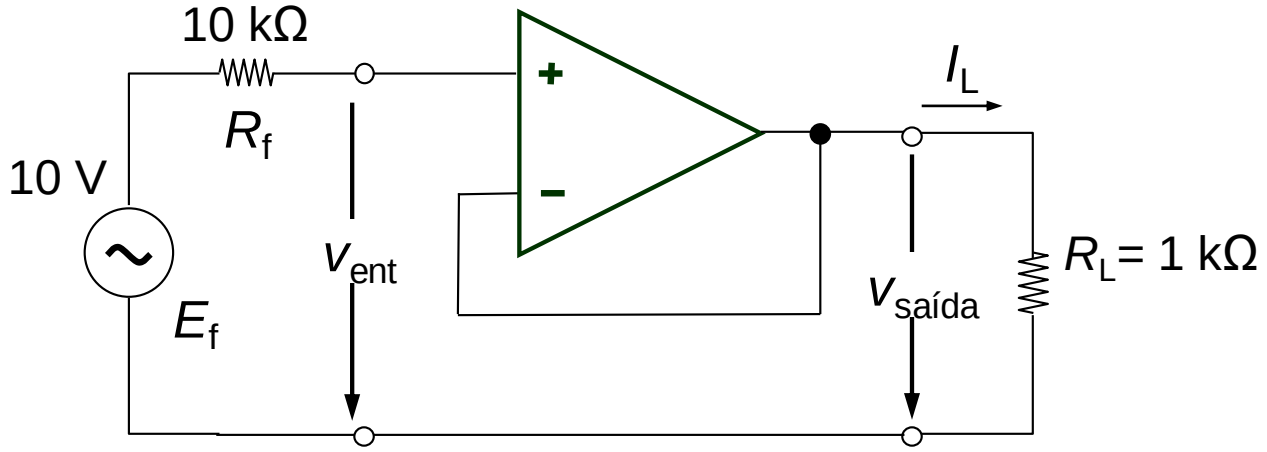
16.1



$$I_L = \frac{10\text{V}}{1\,\text{k}\Omega + 10\,\text{k}\Omega} = 0.909\ \text{mA}$$

$$v_{saída} = 1\,\text{k}\Omega \times 0.909\ \text{mA} = 0.909\ \text{V}$$

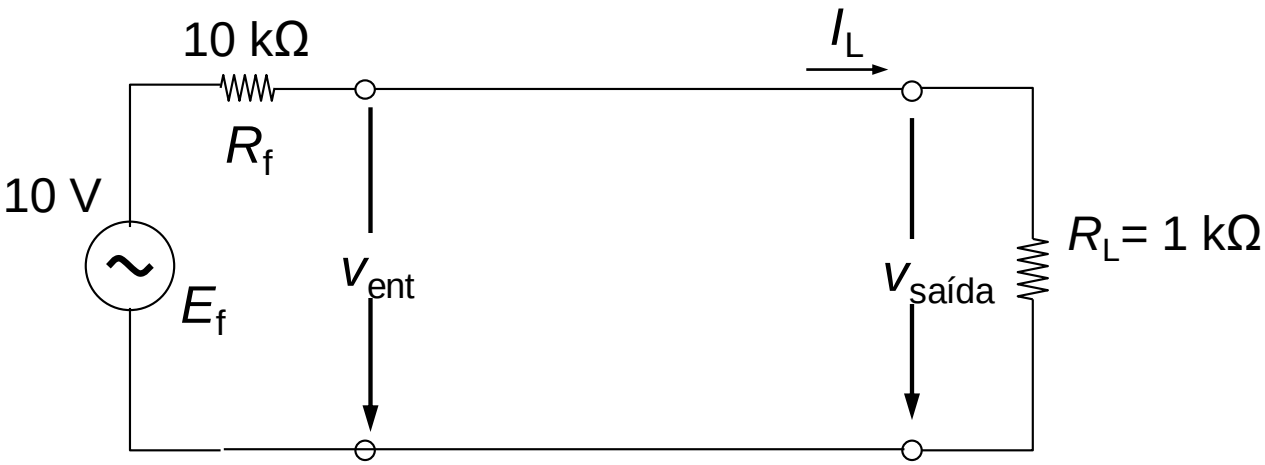
16.2



$$v_{saída} = 10\ \text{V}$$

$$I_L = \frac{10\text{V}}{1\,\text{k}\Omega} = 10\ \text{mA}$$

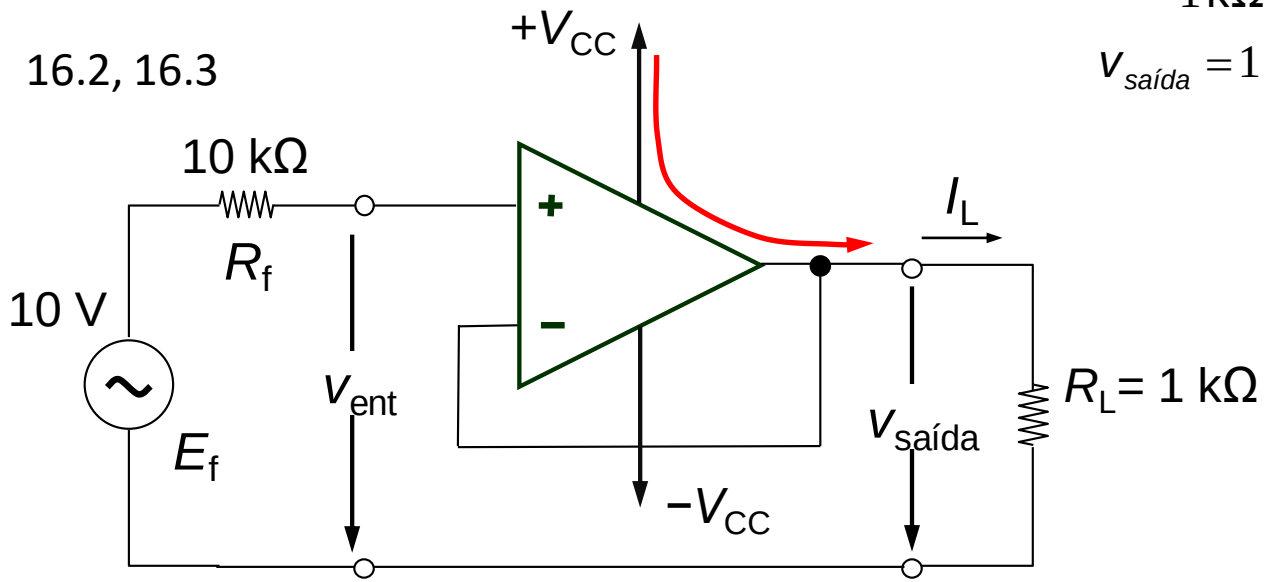
16.1



$$I_L = \frac{10\text{V}}{1\,\text{k}\Omega + 10\,\text{k}\Omega} = 0.909\ \text{mA}$$

$$v_{saída} = 1\,\text{k}\Omega \times 0.909\ \text{mA} = 0.909\ \text{V}$$

16.2, 16.3



$$v_{saída} = 10\ \text{V}$$

$$I_L = \frac{10\text{V}}{1\,\text{k}\Omega} = 10\ \text{mA}$$