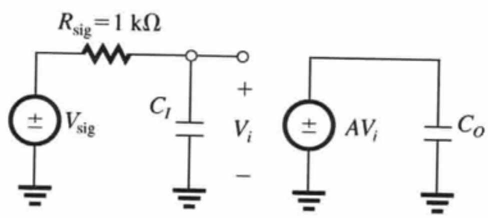
9.57 Using Miller's therem Eq. 9.76

$$Z_1 = \frac{Z}{1-K} \Rightarrow C_I = 0.2 \times (1-(-1000))$$

$$\Rightarrow C_I = 200.2 \text{ pF}$$

$$C_O = 0.2 \times \left(\frac{-1}{1000} + 1\right)$$

$$= 199.8 \text{ fF}$$



$$v_O = Av_i = A \cdot v_{sig} \frac{1/C_I s}{R_{sig} + \frac{1}{C_I \cdot s}}$$

$$\Rightarrow \frac{v_O}{v_{sig}} = \frac{A}{1 + C_I R_{sig} \cdot s}$$

$$\omega_H = \frac{1}{C_I R_{sig}} = \frac{1}{200.2\text{pF} \times 1 \text{ k}\Omega} = 4.99 \text{ M rad/s}$$

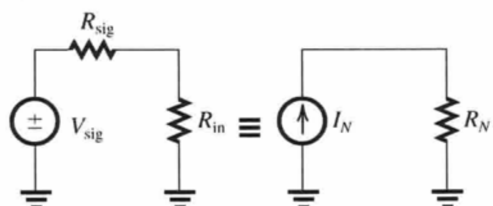
$$\Rightarrow f_H = 795 \text{ KHz}$$

9.59 a) $R_{in} = \frac{R}{1 - A} = \frac{R}{1 - 2} = -R$

(Miller's theorem)

b) $I_N = \frac{V_{sig}}{R_{sig}}$

$R_N = R_{sig} \| R_{in}$

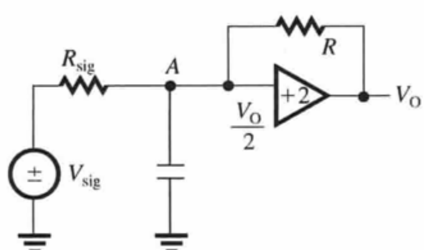


If $R_{sig} = R$ then :

$R_N = R \| (-R) = \infty \Rightarrow I_L = I_N$

$= \frac{V_{sig}}{R_{sig}} = \frac{V_{sig}}{R}$

c)



KCL at A:

$$\frac{\frac{V_O}{2} - V_{sig}}{R_{sig}} + \frac{v_O}{2} \times Cs + \frac{-v_O}{2R} = 0$$

If $R_{sig} = R \Rightarrow \frac{+v_{sig}}{R} = \frac{v_O}{2} Cs \Rightarrow \frac{v_O}{v_{sig}} = \frac{2}{RCs}$