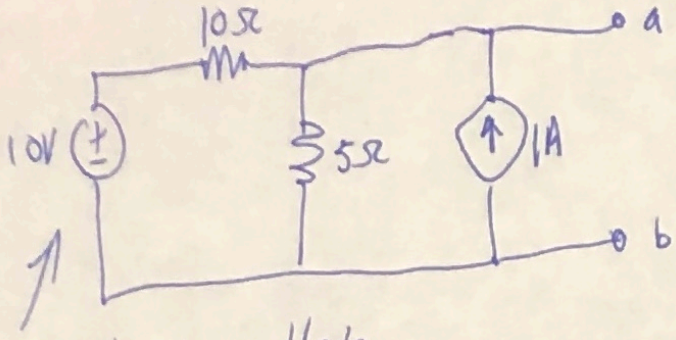
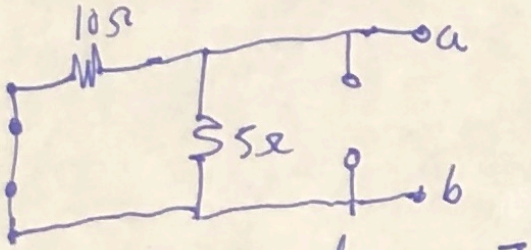
1. como tiene solo fuentes independientes podemos buscar la resistencia equivalente apagando las fuentes.



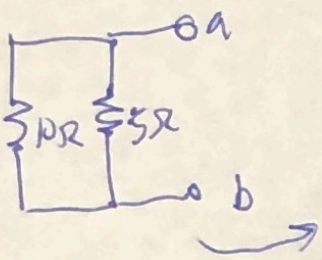
← la fuente de corriente por circuito abierto

la fuente de voltaje se reemplaza por corto circuito

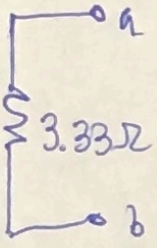
$\left(\frac{1}{5}+\frac{1}{10}\right)^{-1}=\frac{50}{15}$



reorganizando →



→

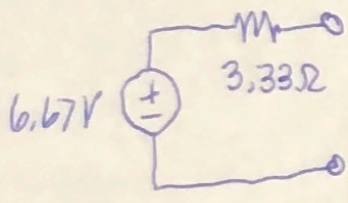


la resistencia equivalente

para Voc opencircuit voltage = V_{TH}

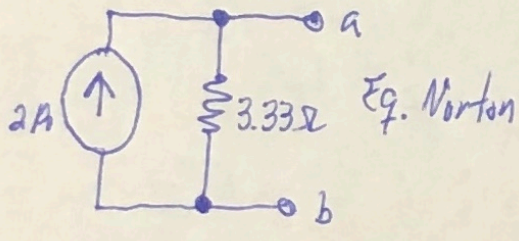
podemos analizar el circuito original por nodos para el voltaje en 'a' asumiendo que la referencia es 'b'

Va: $1=V_a\left(\frac{1}{10}+\frac{1}{5}\right)-10\left(\frac{1}{10}\right)=V_a\left(\frac{3}{10}\right)-1$ $\quad V_a=\frac{20}{3}=6.67V$



Eq. Thevenin

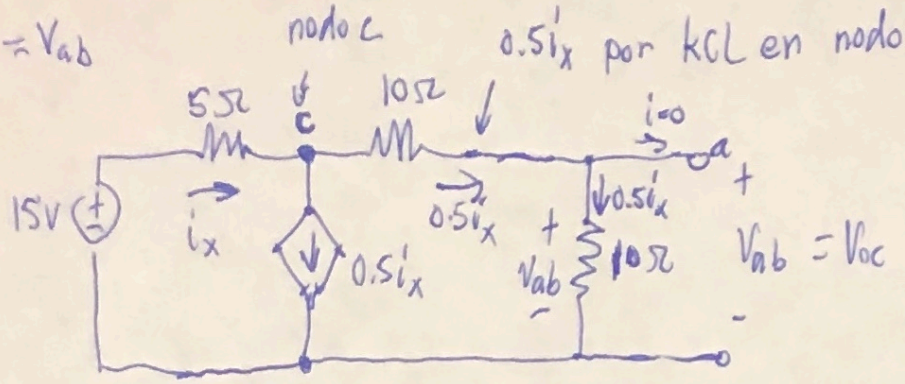
$I_N=\frac{6.67}{3.33}=2A$



Eq. Norton

2. este circuito tiene fuente dependiente, no se pueden apagar las fuentes para conseguir la resistencia equivalente.

$V_{oc} = V_{ab}$



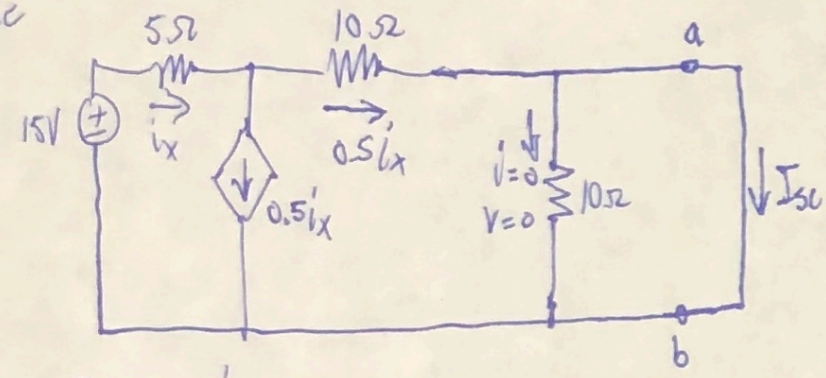
$$V_{oc} = 0.5i_x(10) = 5i_x = 5(1) = 5V \;//\; V_{TH}$$

para i_x

$$15 = 5i_x + 10(0.5i_x) + 10(0.5i_x) = 15i_x$$

$$i_x = 1A$$

I_{sc}



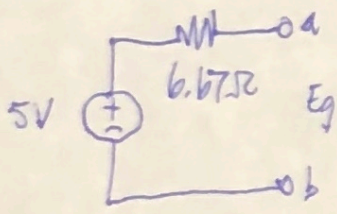
$$I_{sc} = 0.5i_x = 0.75A \;//\; I_N$$

$$R_{eq} = \frac{V_{TH}}{I_N} = \frac{5}{0.75} = 6.67\Omega$$

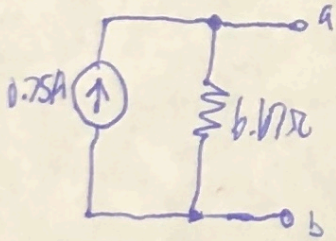
para i_x

$$15 = 5i_x + 10(0.5i_x) = 10i_x$$

$$i_x = 1.5A$$

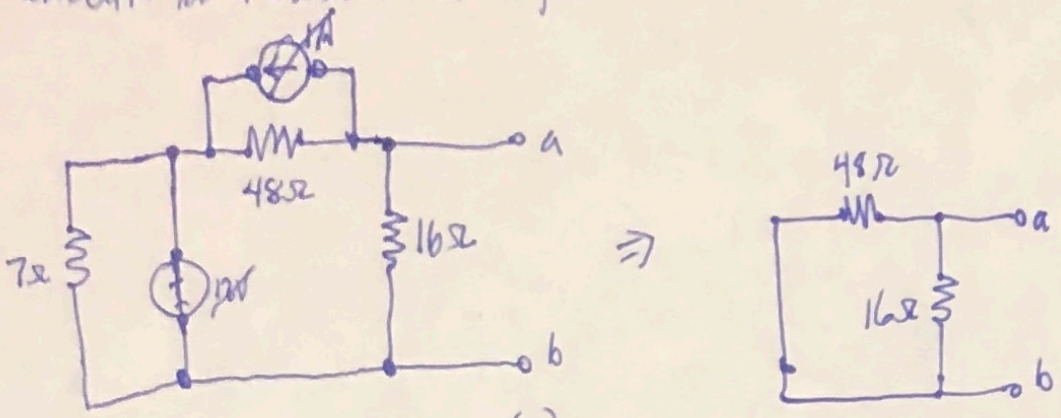


Eq. Thevenin



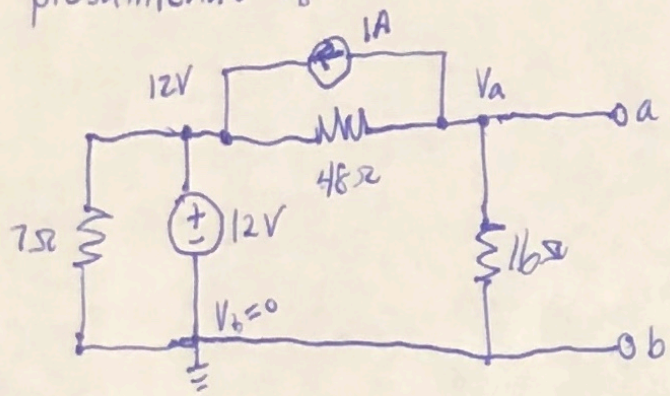
Eq. Norton

3. se pueden apagar las fuentes y buscan la resistencia equivalente



$$R_{eq} = 48 \| 16 = \frac{48(16)}{48+16} = 12\Omega$$

para V_{oc} dejamos el circuito igual y buscamos V_a presumiendo $V_b = 0$



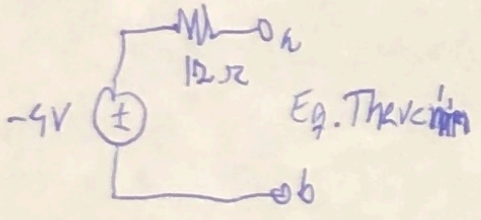
nodos en a

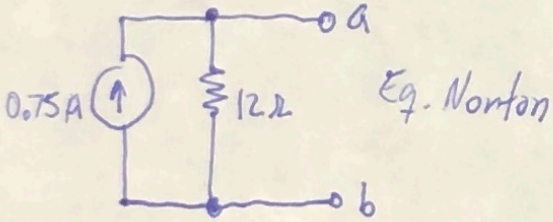
V_a: $-1 = V_a\left(\frac{1}{16} + \frac{1}{48}\right) - 12\left(\frac{1}{48}\right)$

$-48 = 4V_a - 12$

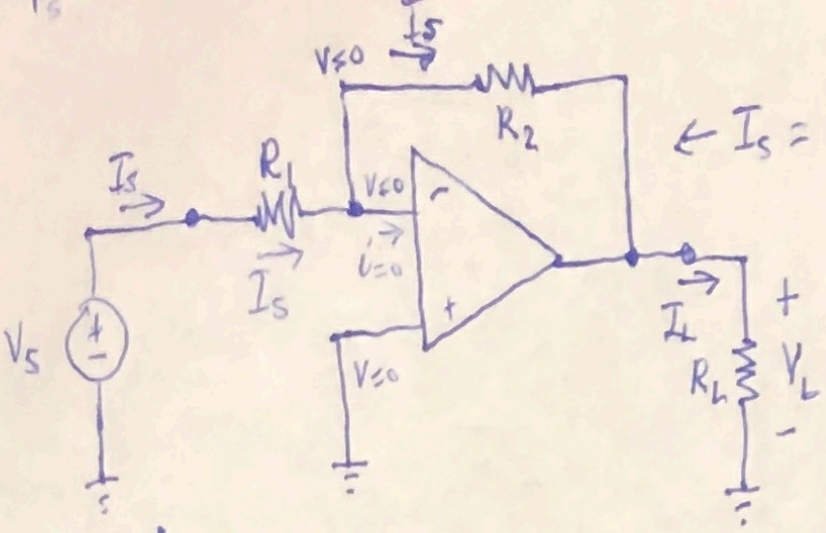
$-36 = 4V_a \quad V_a = -9 = V_{Th}$

$$I_N = \frac{V_{Th}}{R_{eq}} = \frac{-9}{12} = 0.75A$$





4. $G = \frac{P_L}{P_S}$ $\quad P_L = V_L I_L$ $\quad P_S = V_S I_S = \frac{V_S^2}{R_1}$



$\leftarrow I_S = \frac{0 - V_L}{R_2} = \frac{-V_L}{R_2}$

$\leftarrow V_L = R_L I_L$

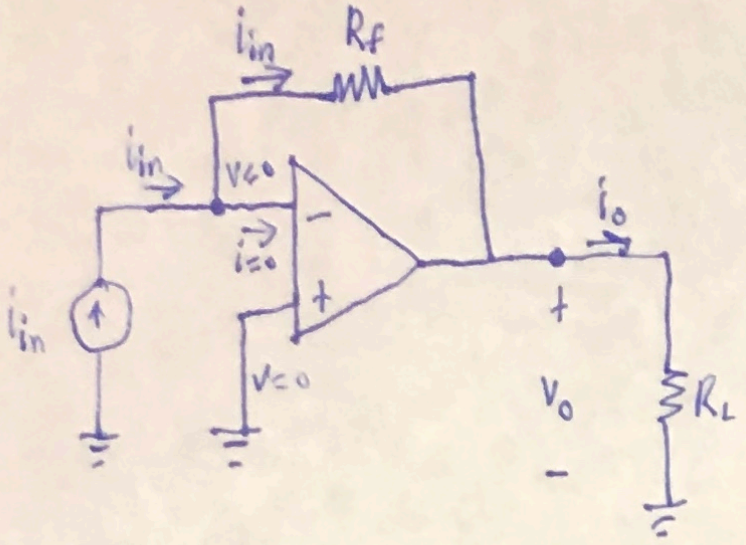
$I_L = \frac{V_L}{R_L} = -V_S\left(\frac{R_2}{R_1 R_L}\right)$

$I_S = \frac{V_S - 0}{R_1} = \frac{V_S}{R_1} = \frac{-V_L}{R_2}$ $\quad \leftarrow V_L = -V_S\left(\frac{R_2}{R_1}\right)$

$$P_L = V_L I_L = V_S^2\left(\frac{R_2}{R_1}\right)\left(\frac{R_2}{R_1 R_L}\right) = V_S^2 \frac{R_2^2}{R_1^2 R_L}$$

$$G = \frac{P_L}{P_S} = \frac{V_S^2 R_2^2}{R_1^2 R_L} \cdot \frac{R_1}{V_S^2} = \frac{R_2^2}{R_1 R_L} \;//$$

5.



$\frac{i_o}{i_{in}} = ?$

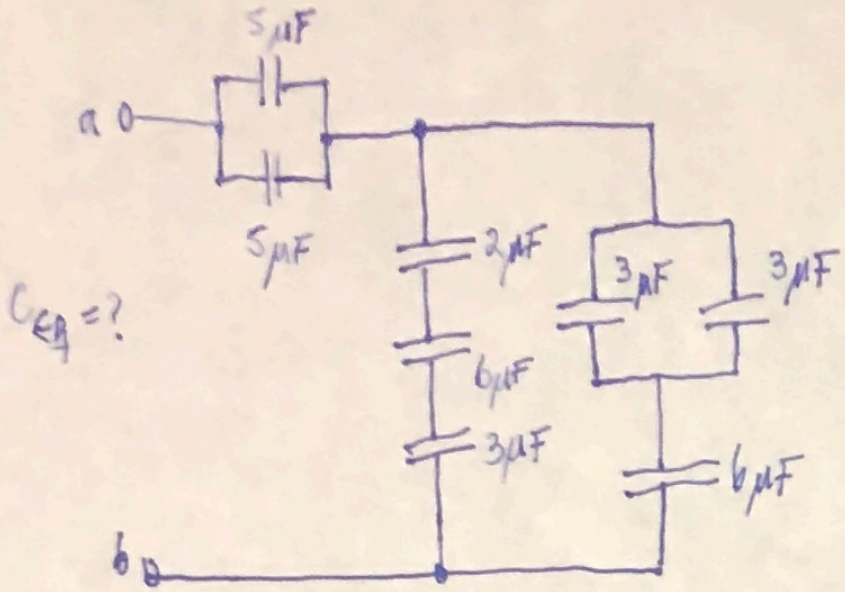
$V_o = R_L i_o$

en R_f $\quad i_{in} = \frac{0 - V_o}{R_f} \qquad i_{in} = \frac{-V_o}{R_f} = \frac{-R_L i_o}{R_f}$

$$i_{in} = \frac{-R_L i_o}{R_f}$$

$$\boxed{\frac{i_o}{i_{in}} = -\frac{R_f}{R_L}} \;//$$

6.

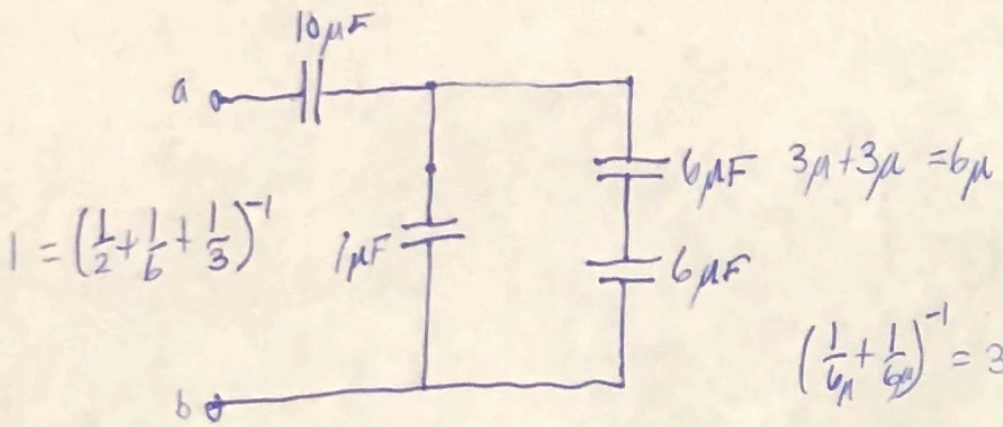


$C_{eq} = ?$

capacitores en paralelo se suman

en serie se suman los reciprocos

$5\mu + 5\mu = 10\mu$

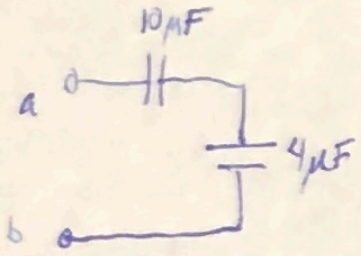


$1 = \left(\frac{1}{2} + \frac{1}{6} + \frac{1}{3}\right)^{-1}$

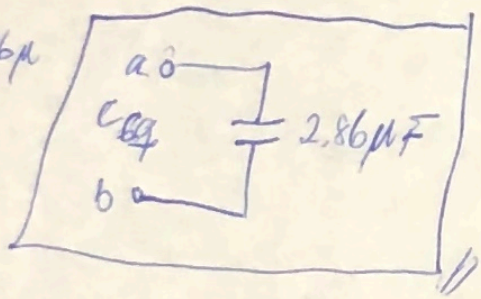
$3\mu + 3\mu = 6\mu$

$\left(\frac{1}{6_\mu} + \frac{1}{6_\mu}\right)^{-1} = 3\mu$

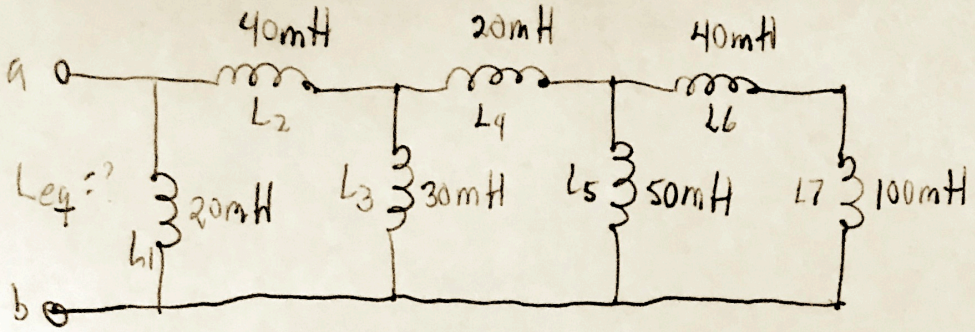
$1 + 3 = 4$



$\left(\frac{1}{10} + \frac{1}{4}\right)^{-1} = 2.86\mu$



7.



las inductancias en serie se suman

en paralelo se suman los reciprocos

$40m + 100m = 140mH$ L_6 y L_7 se suman

$\left(\frac{1}{140} + \frac{1}{50}\right)^{-1} = 36.84\,mH$ resultado en paralelo con L_5

$36.84 + 20 = 56.84\,mH$ en serie con L_4

$\left(\frac{1}{56.84} + \frac{1}{30}\right)^{-1} = 19.64\,mH$ en paralelo con L_3

$19.64 + 40 = 59.64\,mH$ en serie con L_2

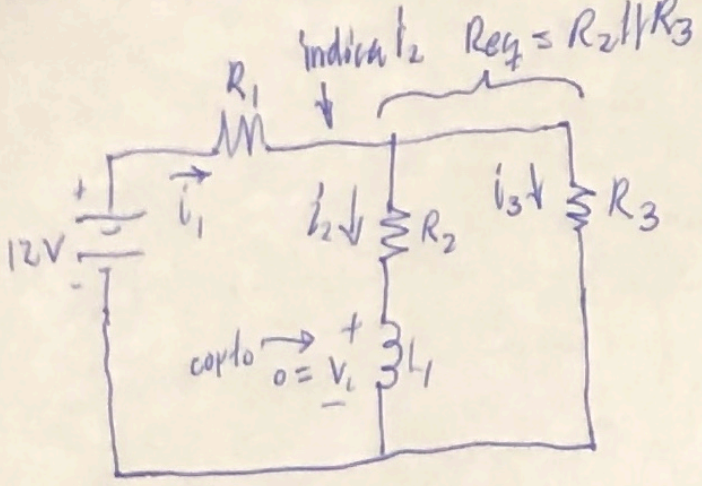
$\left(\frac{1}{59.64} + \frac{1}{20}\right)^{-1} = 14.98\,mH$ en paralelo con L_1

$L_{eq} = 14.98\,mH$ //

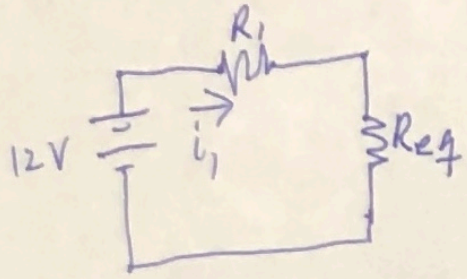
8.

A) Si el circuito lleva much tiempo funcionando el inductor va a tener un voltaje $V_L = L_1 \frac{di_2}{dt}$

Como el circuito es DC todo se vuelve DC asi que $\frac{di_2}{dt} = 0$ $\therefore$ $V_L = 0$ asi que el inductor se vuelve un corto circuito.



divisor de corriente $i_2 = \frac{i_1 R_3}{R_2 + R_3}$



$i_1 = \frac{12V}{R_1 + R_{eq}}$ $R_{eq} = \frac{R_2 R_3}{R_2 + R_3}$

$= \frac{(3.3)(1)}{4.3} = 767\Omega$

$i_1 = \frac{12}{1500 + 767} = 5.29mA$

$i_2 = \frac{(5.29m)(1k)}{4.3k} = 1.23mA$ //

B) $P = (12V)(i_1) = (12)(5.29m) = 63.48mW$ //