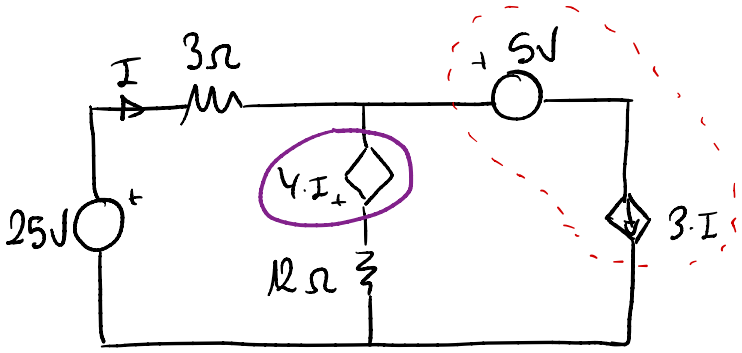
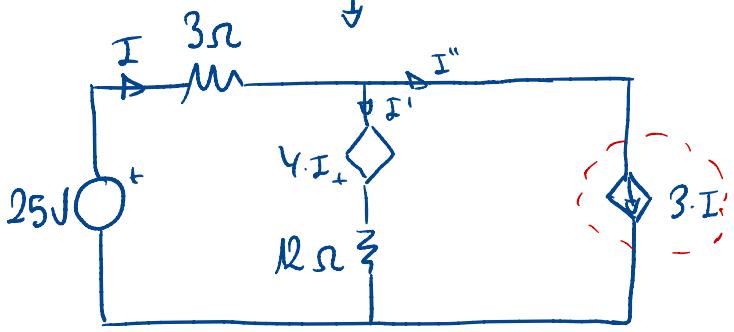
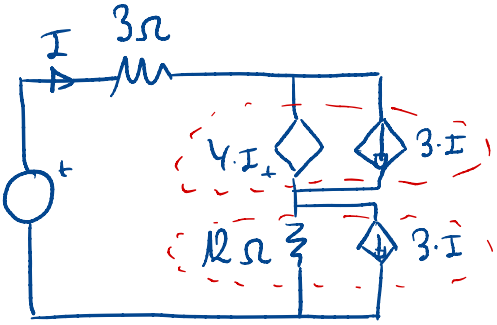
Problema 1.



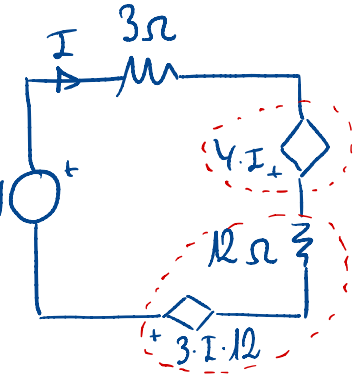
¿Potencia en fuente de tensión dependiente?

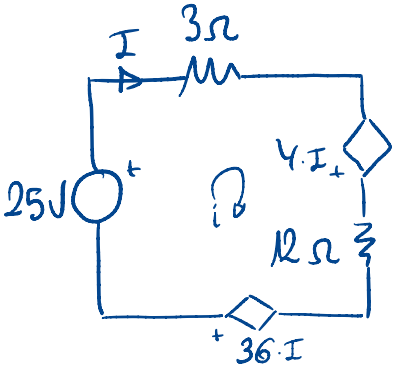
Fuente intensidad en serie con elementos





Fuente tensión en paralelo con elementos → Fuente intensidad en paralelo con resistencia a fuente de tensión en serie con resistencia





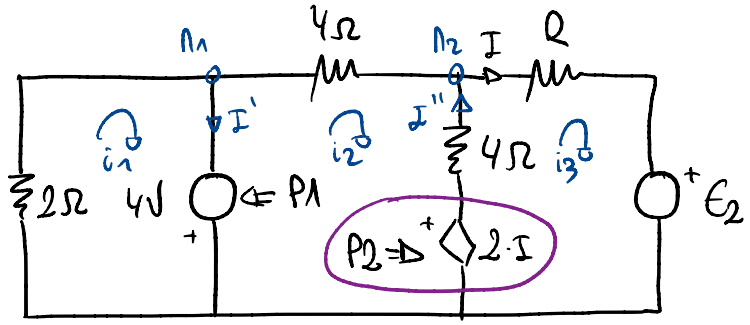
$$\text{¿}\quad 25+36I+4I=i(3+12) \rightarrow 25+40I=15i \xrightarrow{i=I} 25+40I=15I \rightarrow$$
$$\rightarrow 40I-15I=-25 \rightarrow 25I=-25 \rightarrow I=-1\ A$$

$$I=I'+I'' \rightarrow I'=I-I'' \\ I''=3I=3(-1)=-3\ A \Big\} \; I'=-1+3=2\ A$$

$$P=4\cdot I\cdot I'=4\cdot(-1)\cdot 2=-8\ W$$

La fuente consume 8 W

Problema 2.



¿Potencia consumida en P2 si P1 = -4 W?

i_1 $4 = i_1 \cdot 2 \rightarrow 2 = i_1 \rightarrow i_1 = 2\,A$

i_2 $-4 - 2I = i_2(4+4) - i_3 \cdot 4 \rightarrow -2 - I = i_2 \cdot 4 - i_3 \cdot 2 \xrightarrow{I = i_3} -2 = i_2 \cdot 4 - i_3$ *

i_3 $2 \cdot I + \mathcal{E}_2 = i_3(4+R) - i_2 \cdot 4 \xrightarrow{I = i_3} \mathcal{E}_2 = i_3(2+R) - i_2 \cdot 4$

$P1 = -4 = 4 \cdot I' \rightarrow I' = -1\,A$

n_1 • $i_1 = I' + i_2 \rightarrow i_2 = i_1 - I' = 2 - (-1) = 3\,A$

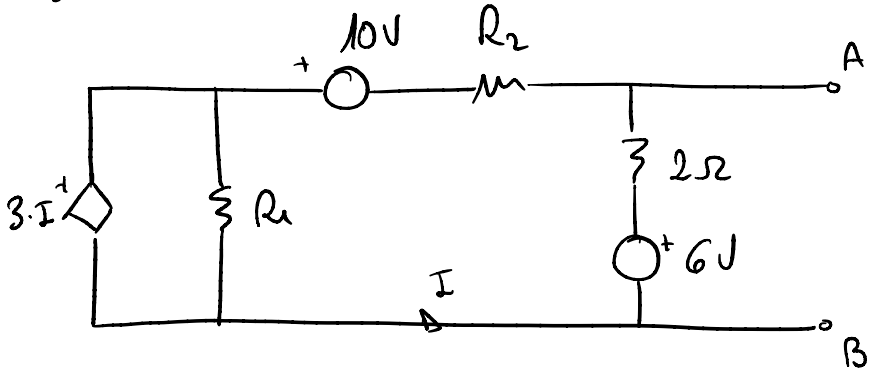
* $-2 = i_2 \cdot 4 - i_3 \rightarrow i_3 = i_2 \cdot 4 + 2 = 3 \cdot 4 + 2 = 12 + 2 = 14\,A$

n_2 • $i_2 + I'' = I \rightarrow I'' = I - i_2 = i_3 - i_2 = 14 - 3 = 11\,A$

$P = 2 \cdot I \cdot I'' = 2 \cdot 14 \cdot 11 = 308\,W$

La fuente en P2 genera 308 W → consume - 308 W

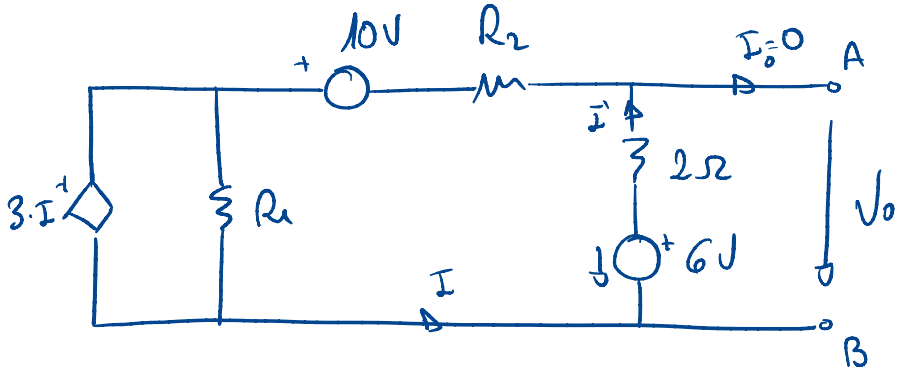
Problema 3.



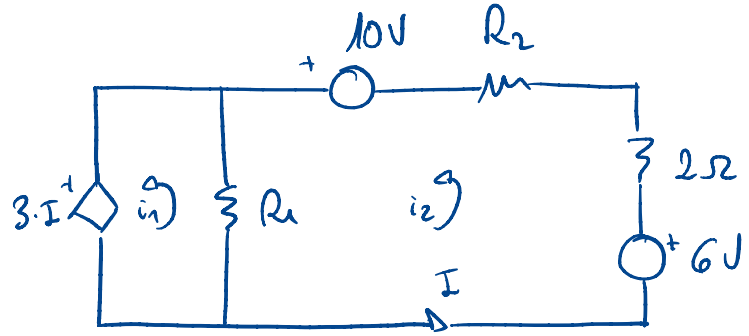
$I_o = 2A$

¿ R_{th} ?

- Tensión a circuito abierto



$$\left.\begin{array}{l} V_o = 6 - I' \cdot 2 \\ I' = I + \cancel{I_o}^{\,0} = I \end{array}\right\} \quad V_o = 6 - I \cdot 2$$



i_1) $-3 \cdot I = i_1 \cdot R_1 - i_2 \cdot R_1 \xrightarrow{I = i_2} 0 = i_1 \cdot R_1 - i_2 (R_1 - 3)$

i_2) $6 + 10 = i_2 \cdot (R_1 + R_2 + 2) - i_1 \cdot R_1$

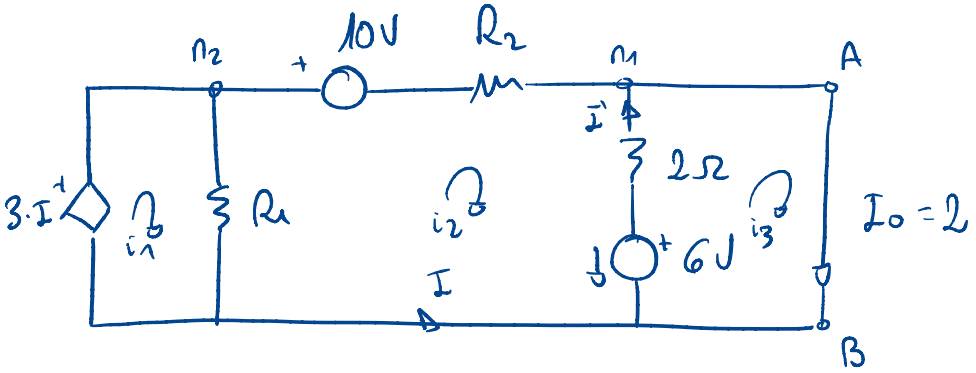
$$\begin{pmatrix} 0 \\ 16 \end{pmatrix} = \begin{pmatrix} R_1 & 3 - R_1 \\ -R_1 & R_1 + R_2 + 2 \end{pmatrix} \begin{pmatrix} i_1 \\ i_2 \end{pmatrix}$$

$$i_2 = \frac{\begin{vmatrix} R_1 & 0 \\ -R_1 & 16 \end{vmatrix}}{\begin{vmatrix} R_1 & 3-R_1 \\ -R_1 & R_1+R_2+2 \end{vmatrix}} = \frac{R_1 \cdot 16}{R_1(R_1+R_2+2)+R_1(3-R_1)} = \frac{16}{R_1+R_2+2+3-R_1} = \frac{16}{R_2+5}$$

$$U_0 = 6 - \frac{16}{R_2+5}\cdot 2 = \frac{6(R_2+5)-32}{R_2+5} = \frac{6R_2+30-32}{R_2+5} = \frac{6R_2-2}{R_2+5}$$

$$R_{th} = \frac{U_0}{I_0} = \frac{\frac{6R_2-2}{R_2+5}}{2} = \frac{3R_2-1}{R_2+5} \quad (1)$$

- Intensidad de cortocircuito



i_1: $3\cdot I = i_1\cdot R_1 - i_2\cdot R_1 \xrightarrow{I=-i_2} 0 = i_1\cdot R_1 - i_2\cdot(R_1-3) \Rightarrow i_1 = \frac{i_2(R_1-3)}{R_1}$

i_2: $-10-6 = i_2(R_1+R_2+2) - R_1\cdot i_1 - 2\cdot i_3$ *

i_3: $6 = i_3\cdot 2 - i_2\cdot 2 \xrightarrow{i_3=I_0=2} 6 = 2\cdot 2 - i_2\cdot 2 \Rightarrow 3 = 2 - i_2 \Rightarrow i_2 = -1\,A$

n_1:

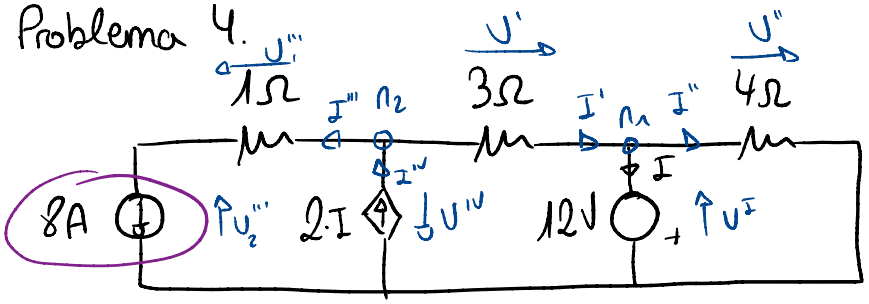
$i_2 + I' = i_3 \Rightarrow I' = i_2 - i_3 = -1-2 = -3\,A$

$$\left.\begin{aligned} i_2 &= -1A \\ i_1 &= \frac{i_2(R_1-3)}{R_1} \end{aligned}\right\} \; i_1 = \frac{-1(R_1-3)}{R_1} = \frac{-R_1+3}{R_1}$$

* $-16 = -1(R_1+R_2+2) - R_1\cdot\frac{-R_1+3}{R_1} - 2\cdot 2 \Rightarrow -16 = -R_1 - R_2 - 2 + R_1 - 3 - 4 \Rightarrow$
$\Rightarrow R_2 = 16-2-3-4 = 7$

(1) $R_{th} = \frac{3\cdot 7-1}{7+5} = \frac{21-1}{12} = \frac{20}{12} = \frac{5}{3}\,\Omega$

Problema 4.



Potencia generada en fuente de intensidad independiente

n_1 o $I' = I + I''$

$I'' = \frac{U''}{4} = \frac{-U^{IV}}{4} = \frac{-12}{4} = -3A$ $\Big\}$ $I' = I - 3$ $\Big\}$ $2 \cdot I = 8 + I - 3 \rightarrow I = 8 - 3 = 5A$

n_2 o $I'''' = I''' + I'$

$I''' = 8A$

$I'''' = 2 \cdot I$

$I' = 5 - 3 = 2A$

$I'''' = 2 \cdot 5 = 10A$

$U' = I' \cdot 3 = 2 \cdot 3 = 6V$

$U_1''' = I''' \cdot 1 = 8 \cdot 1 = 8V$

$12 = U_2''' - U_1''' + U'$

$U_2''' = 12 + U_1''' - U'$

$12 + 8 - 6 = +14$

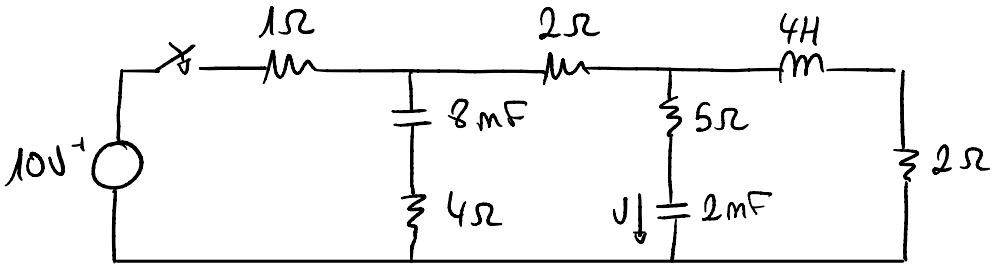
$U^{IV} = -U'''' + U' \rightarrow U'''' = U' - U^{IV} = 6 - 12 = -6V$

$U'''' = U_1''' - U_2''' \rightarrow U_2''' = U_n''' - U'''' = 8 - (-6) = 14V$

$P_2''' = U_2''' \cdot 8 = 14 \cdot 8 = 112W$

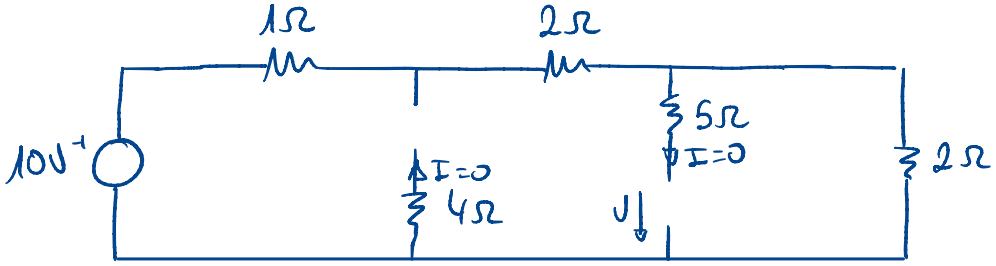
La fuente de intensidad independiente genera 112 W

Problema 5.

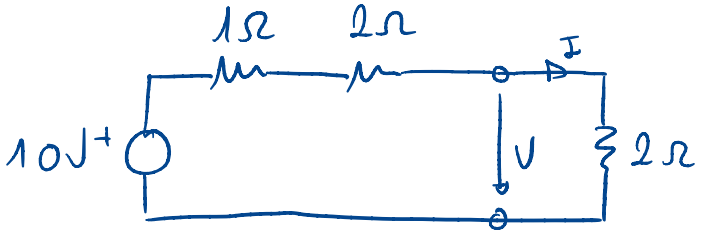


En $t=0$ se cierra el interruptor. En régimen permanente ¿u?

Régimen estacionario, corriente continua:
- bobina - comportamiento equivalente a un cortocircuito
- condensador - comportamiento equivalente a un circuito abierto



↓ El problema es del estilo

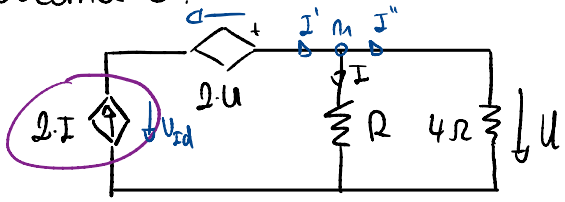


$U = I \cdot 2$

$10 = I(1+2+2) = I \cdot 5 \rightarrow I = \frac{10}{5} = 2\,A$

$U = 2 \cdot 2 = 4\,V$

Problema 6.



Potencia generada por la fuente de intensidad dependiente

$U = 8V$

n:

$$\left.\begin{array}{l} I' = I'' + I \\ I' = 2 \cdot I \\ I'' = \frac{U}{4} = \frac{8}{4} = 2A \end{array}\right\} \; 2 \cdot I = 2 + I \rightarrow I = 2A$$

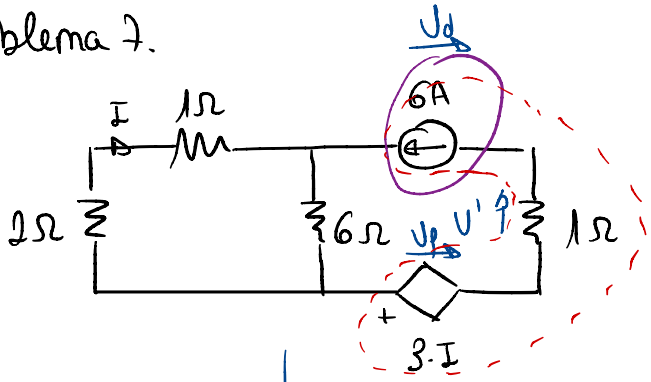
$U = 2 \cdot U + U_{Id} \rightarrow U_{Id} = U - 2 \cdot U = -U = -8V$

$P = U_{Id} \cdot 2 \cdot I = -8 \cdot 2 \cdot 2 =$

$P = U_{Id} \cdot 2 \cdot I = -8 \cdot 2 \cdot 2 = -32W$

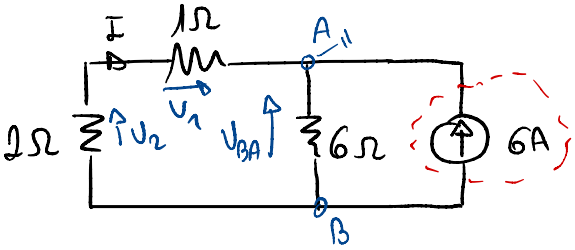
La potencia generada en la fuente de intensidad dependiente es -32W o, lo que es lo mismo, consume 32W

Problema 7.



Potencia consumida por la fuente de intensidad independiente

Fuente de intensidad en serie con elementos



$$B \cdot \; -6 = U_{BA}\left(\frac{1}{2}+\frac{1}{1}+\frac{1}{6}\right) \rightarrow -6 = U_{BA}\,\frac{6+12+2}{12} \rightarrow U_{BA} = \frac{-6}{\frac{5}{3}} = \frac{-18}{5}\,V$$

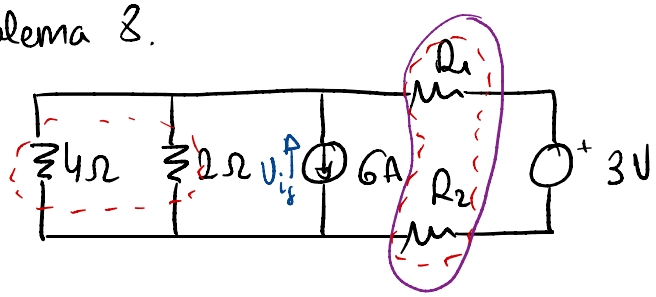
$$U_{BA} = U_2 + U_1 \rightarrow \frac{-18}{5} = 2\cdot I + 1\cdot I \rightarrow I = \frac{-6}{5}\,A$$

$$U_{BA} = U_f + U' - U_d \rightarrow U_d = U_f + U' - U_{BA} = 3\cdot I + 1\cdot 6 + \frac{18}{5} = 3\cdot\frac{-6}{5} + 6 + \frac{18}{5} = 6\,V$$

$$P = U_f \cdot 6 = 6\cdot 6 = 36\,W$$

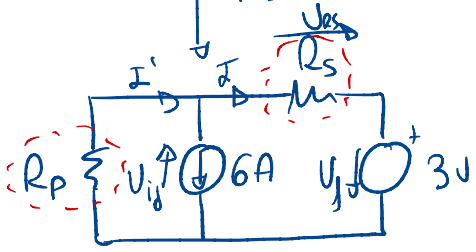
La fuente genera 36 W por consiguiente, consume -36 W

Problema 8.



Potencia consumida por R_1 y R_2 si fuente de intensidad genera 24 W

Asociación de resistencias



$R_S = R_1 + R_2$

$R_P = \frac{4 \cdot 2}{4+2} = \frac{4 \cdot 1}{2+1} = \frac{4}{3}\ \Omega$

$P_{ig} = U_{ig} \cdot 6 \rightarrow U_{ig} = \frac{P_{ig}}{6} = \frac{24}{6} = 4\ V$

$U_{ig} = I' \cdot R_P \rightarrow I' = \frac{U_{ig}}{R_P} = \frac{4}{4/3} = 3\ A$

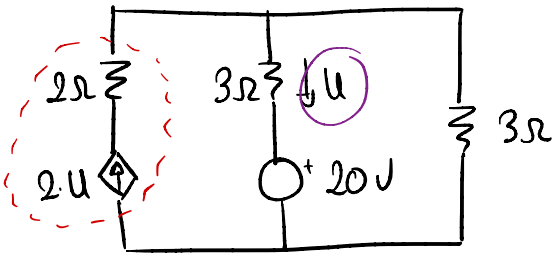
$I' = 6 + I \rightarrow I = I' - 6 = -3\ A$

$U_{ig} = -U_f - U_{RS} \rightarrow U_{RS} = -U_f - U_{ig} = -3 - 4 = -7\ V$

$P_{RS} = U_{ig} \cdot I = -7 \cdot (-3) = 21\ W$

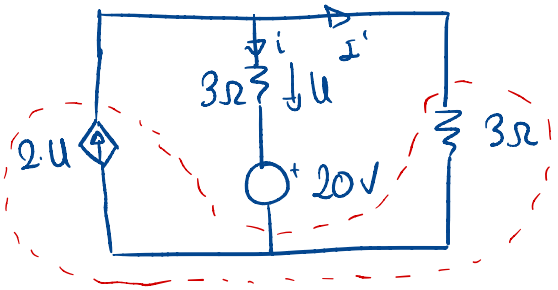
Las resistencias R_1 y R_2 consumen 21 W

Problema 9.

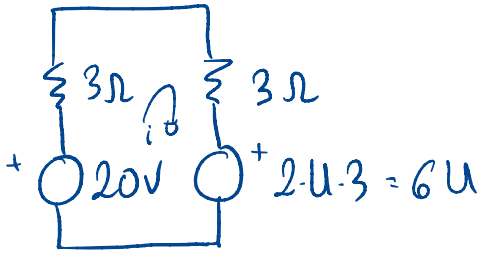


Determinar U

Fuente de intensidad en serie con elementos



Fuente de intensidad en paralelo con resistencia



$$\circlearrowright \quad 20 - 6U = i(3+3) = i \cdot 6 \rightarrow i = \frac{20-6U}{6} = \frac{10-3U}{3}$$

$$2 \cdot U = i + I' \rightarrow I' = 2U - i$$

$$I' = 2U - \frac{10-3U}{3} = \frac{6U-10+3U}{3} = \frac{9U-10}{3}$$

$$\frac{9U-10}{3} \cdot 3 = U + 20 \rightarrow 9U - 10 = U + 20 \rightarrow 8U = 30$$

$$\rightarrow U = \frac{30}{8}$$