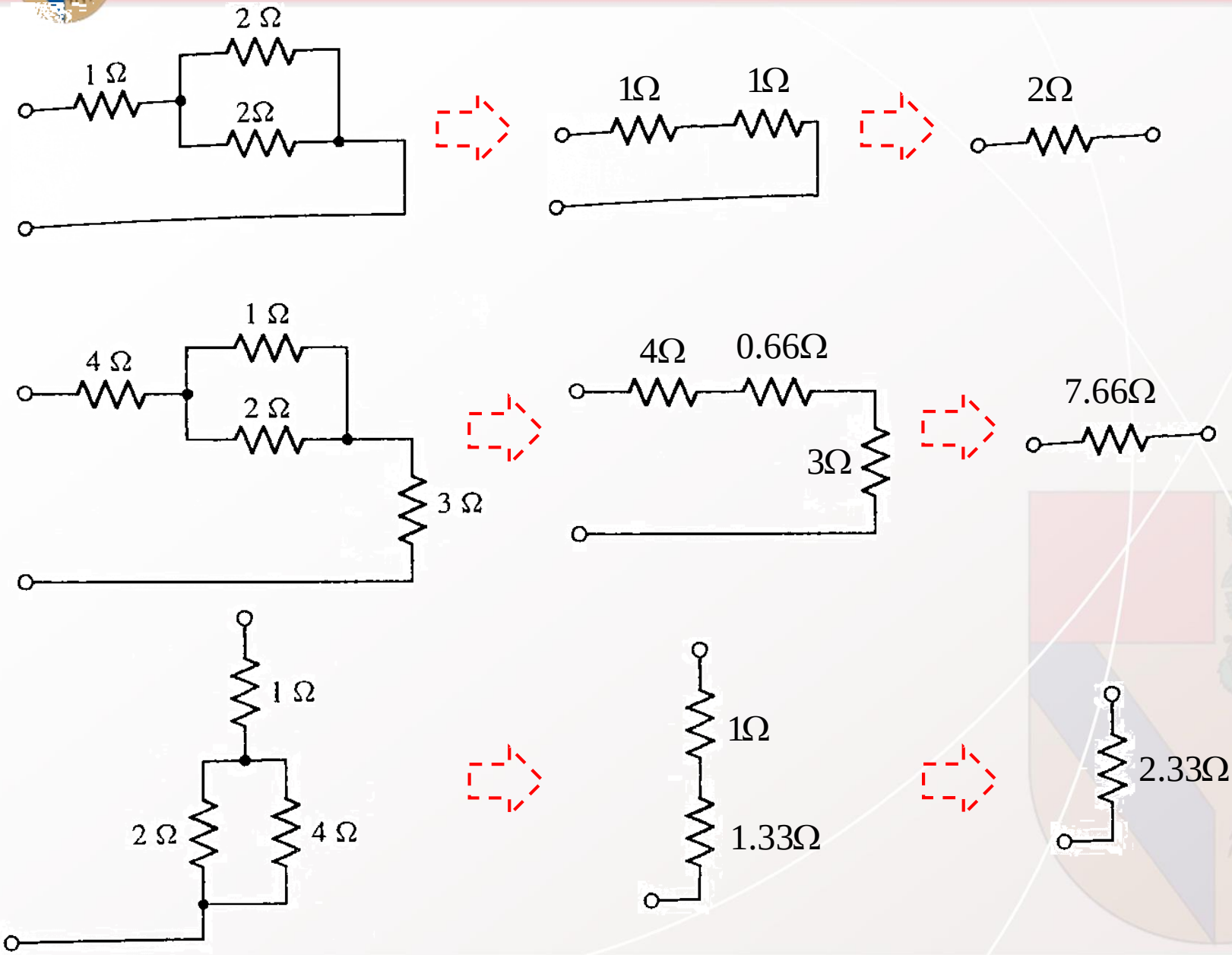
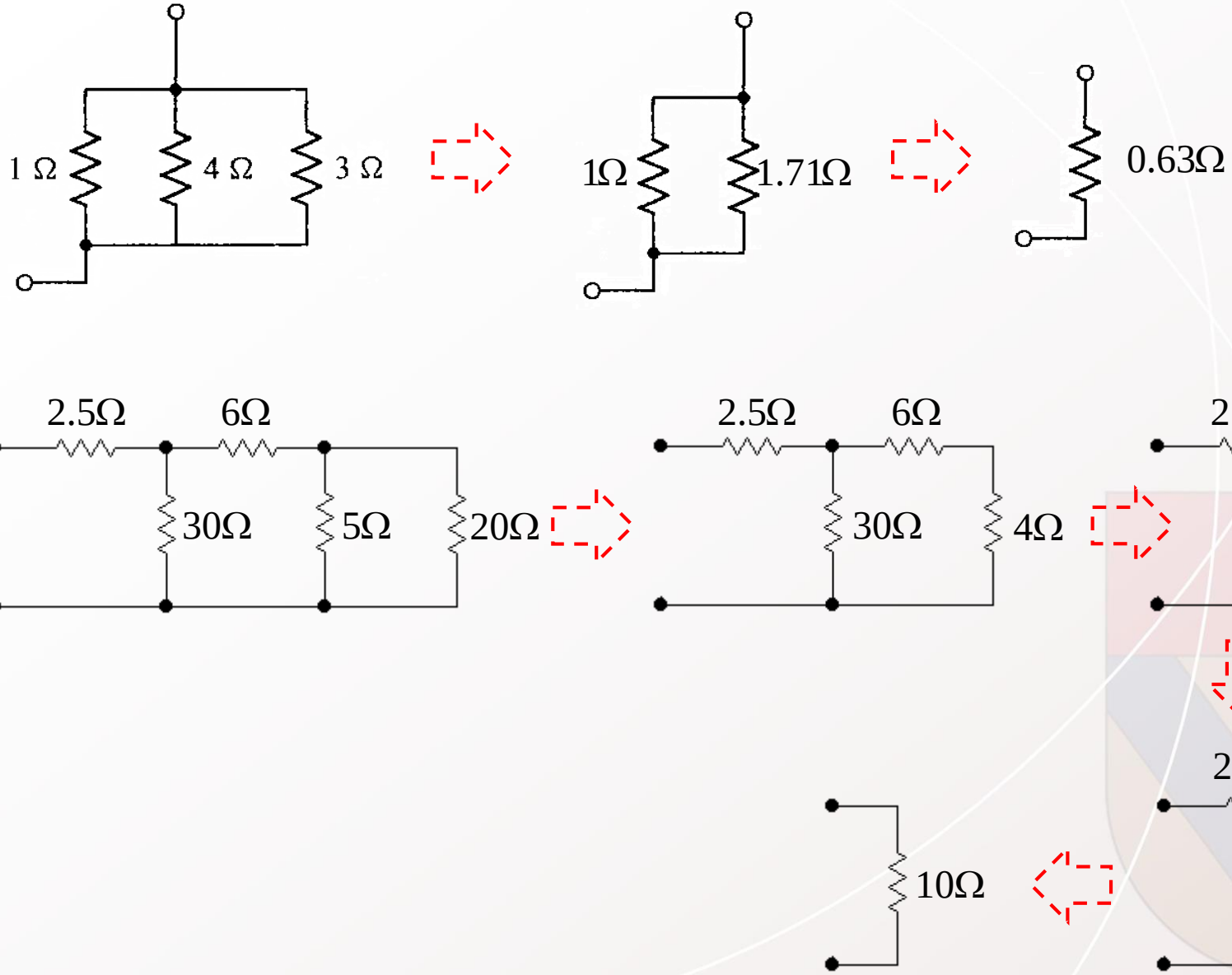
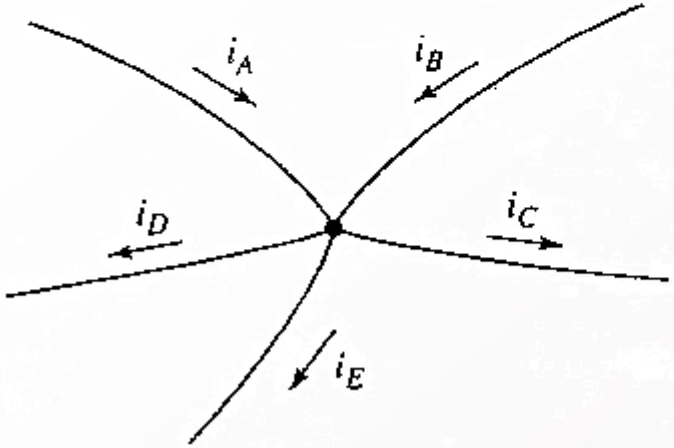

2 Ω
1 Ω
2Ω
1Ω
1Ω
2Ω
1 Ω
4 Ω
2 Ω
3 Ω
4Ω
0.66Ω
3Ω
7.66Ω
1 Ω
2 Ω
4 Ω
1Ω
1.33Ω
2.33Ω

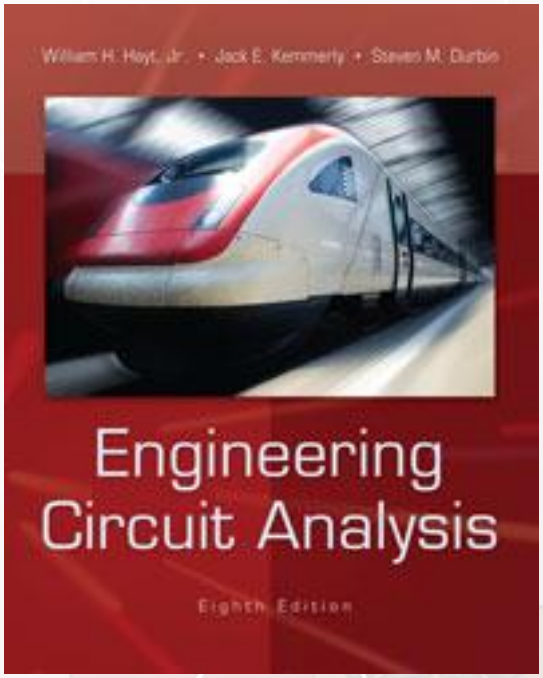

1 Ω
4 Ω
3 Ω
1Ω
1.71Ω
0.63Ω
2.5Ω
6Ω
30Ω
5Ω
20Ω
2.5Ω
6Ω
30Ω
4Ω
2.5Ω
30Ω
10Ω
10Ω
2.5Ω
7.5Ω

7. Observando el diagrama de un solo nodo de la figura 3.49, calcule:

(*a*) i_B, si $i_A = 1$ A, $i_D = -2$ A, $i_C = 3$ A, e $i_E = 0$;

(*b*) i_E, si $i_A = -1$ A, $i_B = -1$ A, $i_C = -1$ A, e $i_D = -1$ A.





a)

$$i_A + i_B = i_C + i_D + i_E$$

$$1 + i_B = 3 + (-2) + 0$$

$$i_B = 3 - 2 - 1 = 0$$

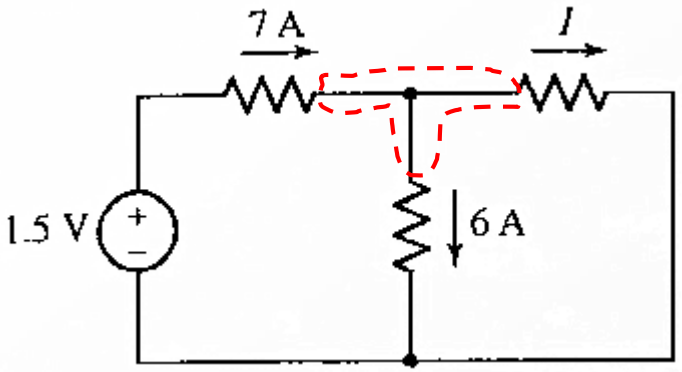
b)

$$i_A + i_B = i_C + i_D + i_E$$

$$-1 + (-1) = -1 + (-1) + i_E$$

$$-2 + 2 = i_E = 0$$

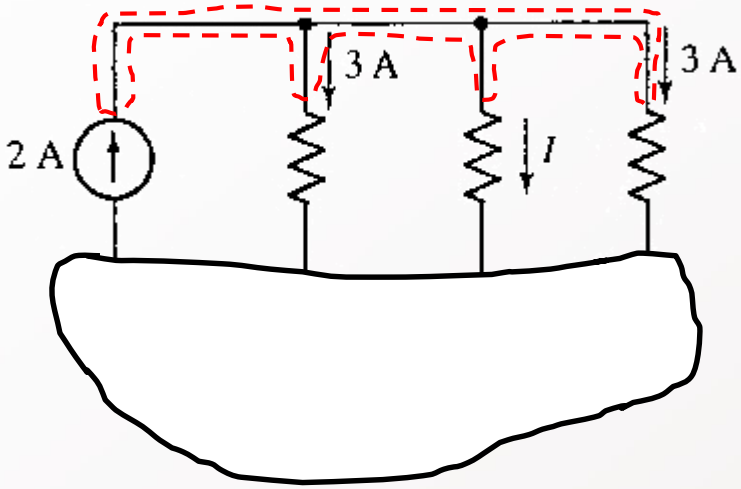
Aplique la ley de kirchhoff de corrientes para encontrar la corriente marcada como “I”.



$$7 = 6 + I$$

$$I = 7 - 6$$

$$\boxed{I = 1}$$

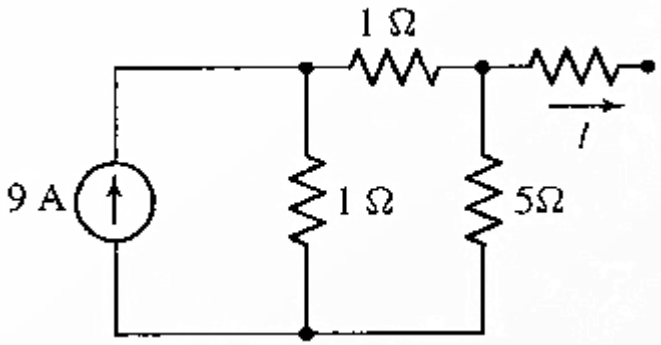


$$2 = 3 + I + 3$$

$$I = 2 - 3 - 3$$

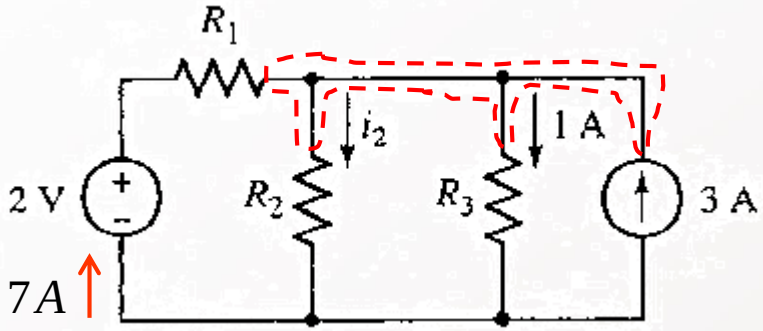
$$\boxed{I = -4}$$

Aplique la ley de kirchhoff de corrientes para encontrar la corriente marcada como “I”.



$$I = 0$$

Identifique si hay resistencias en serie y/o paralelo.
Calcule la corriente i2 si se sabe que la fuente de 2V suministra una corriente de 7A.

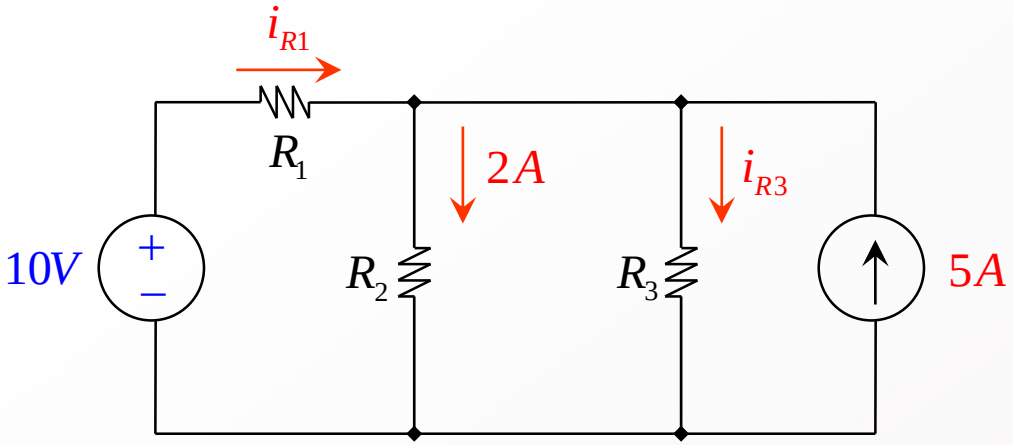


$$7 + 3 = i_2 + 1$$

$$i_2 = 7 + 3 - 1$$

$$i_2 = 9$$

Encuentre la corriente i_{R3} si se sabe que la corriente de la fuente de voltaje es 3A.



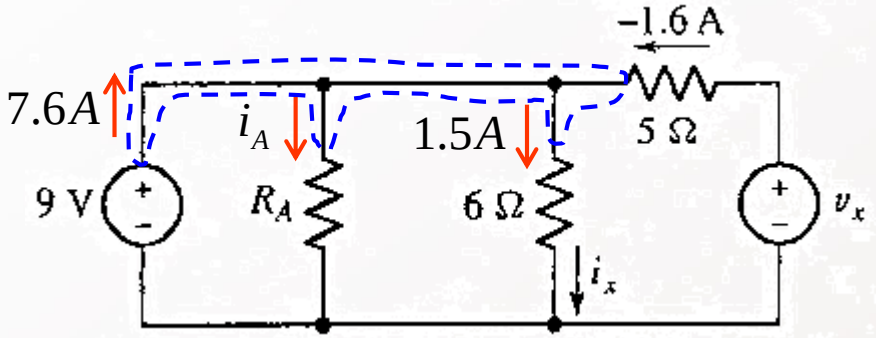
$$i_{R1} + 5 = 2 + i_{R3}$$

$$i_{R1} = 3$$

$$3 + 5 = 2 + i_{R3}$$

$$i_{R3} = 6$$

Encuentre el valor de i_A y posteriormente de R_A si se sabe que i_X=1.5A y que la fuente de 9V suministra una corriente de 7.6 A.



$$7.6 - 1.6 = 1.5 + i_A$$

$$i_A = 7.6 - 1.6 - 1.5$$

$$i_A = 4.5$$

$$V = RI \quad \therefore 9 = R_A i_A = R_A \times 4.5$$

$$R_A = \frac{9}{4.5} = 2$$

3.3 Ley de tensiones de Kirchhoff

16. Para el circuito de la figura 3.57:

(*a*) Determine la tensión v_1 si $v_2 = 0$ y $v_3 = -17$ V. $v_1 = 0 - (-17) = 17$

(*b*) Determine la tensión v_1 si $v_2 = -2$ V y $v_3 = +2$ V. $v_1 = -2 - 2 = -4$

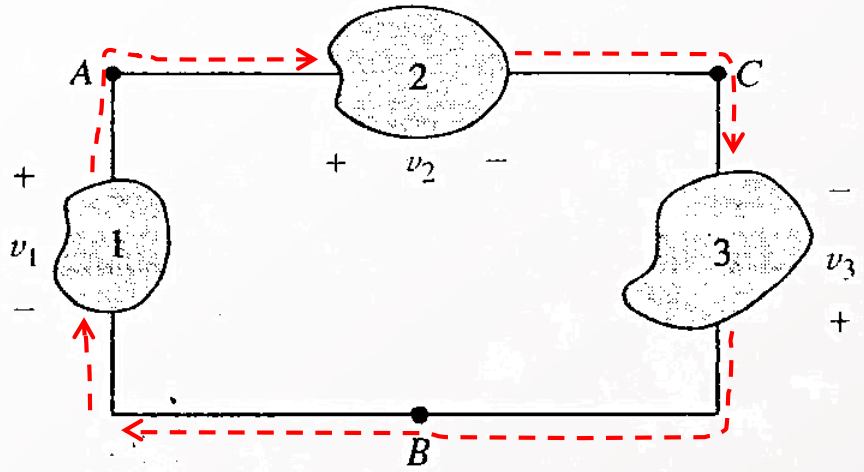
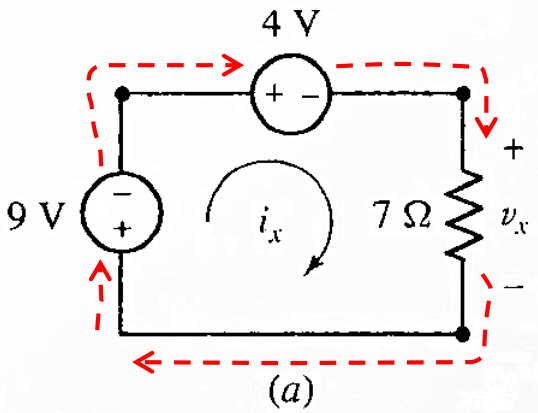


FIGURA 3.57

$$-v_1 + v_2 - v_3 = 0$$

$$v_1 = v_2 - v_3$$

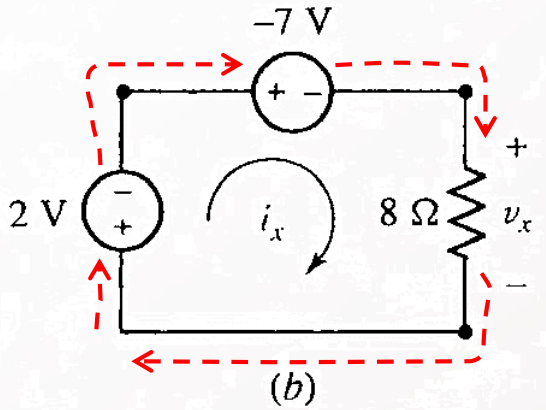
17. Para cada uno de los circuitos de la figura 3.58, determine la tensión v_x y la corriente i_x.



$$+9+4+v_x=0$$

$$v_x=-13$$

$$i_x=\frac{v_x}{7}=\frac{-13}{7}=-1.8571$$

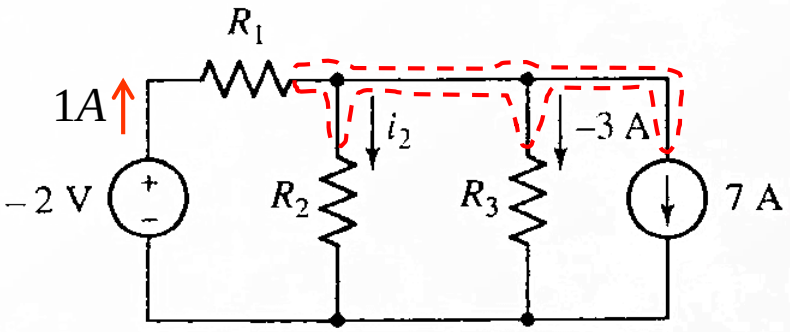


$$+2+(-7)+v_x=0$$

$$v_x=5$$

$$i_x=\frac{v_x}{8}=\frac{5}{8}=0.625$$

10. La fuente de tensión en el circuito de la figura 3.52 tiene una corriente de 1 A que sale de la terminal positiva hacia la resistencia R_1. Calcule la corriente marcada como i_2.



■ **FIGURA 3.52**

Corrientes que entran al nodo.

Corrientes que salen del nodo.

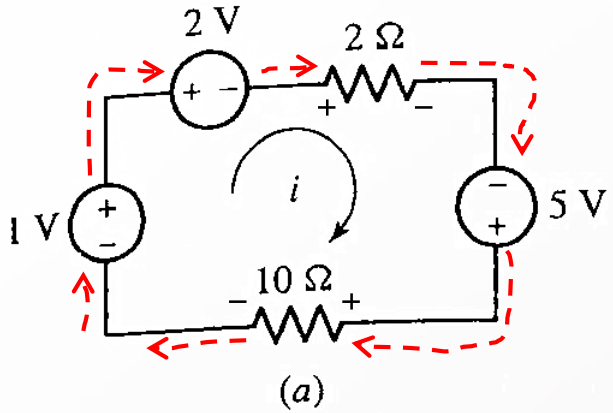
$$1 = i_2 - 3 + 7$$

$$i_2 = 1 + 3 - 7$$

$$i_2 = -3$$

18. Use la LVK para obtener un valor numérico para la corriente etiquetada i en cada circuito representado en la figura 3.59.

$$v = Ri = 2i$$

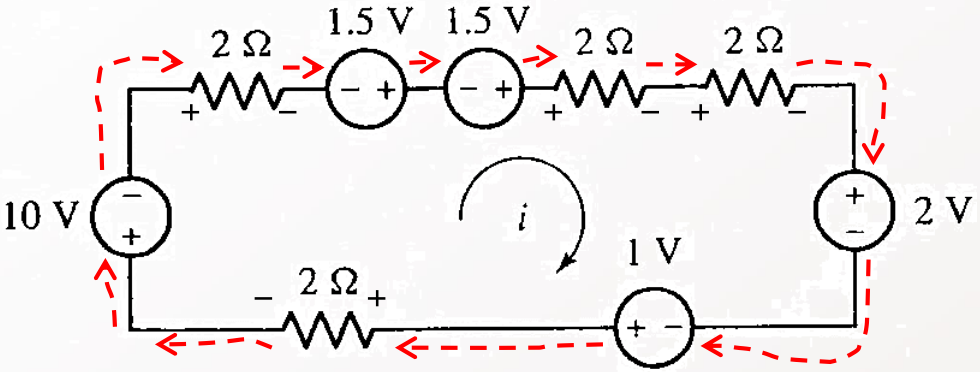


(a)

$$-1+2+2i-5+10i=0$$

$$-4+12i=0$$

$$i=\frac{4}{12}=\frac{1}{3}$$



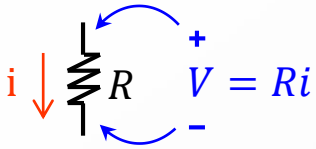
(b)

$$+10+2i-1.5-1.5+2i+2i+2-1+2i=0$$

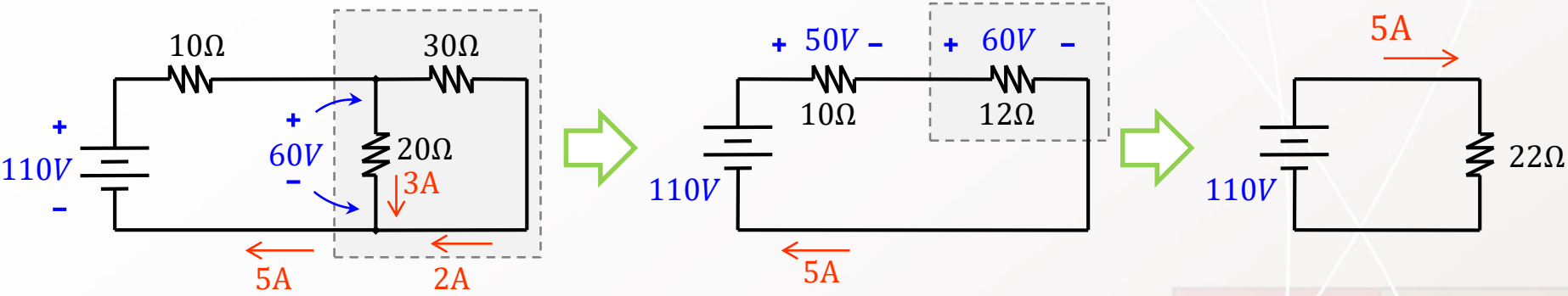
$$+8+8i=0$$

$$i=-1$$

Calculo de corrientes específicas



$$R_s = R_a + R_b \qquad R_p = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} \qquad R_p = \frac{R_a R_b}{R_a + R_b}$$



$$i_{30} = \frac{60}{30} = 2A$$

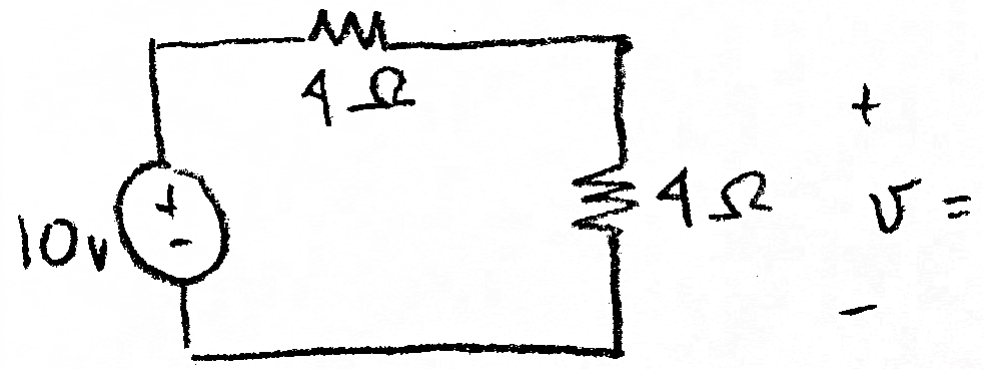
$$i_{20} = \frac{60}{20} = 3A$$

$$R_p = \frac{20 \times 30}{20 + 30} = 12\Omega$$

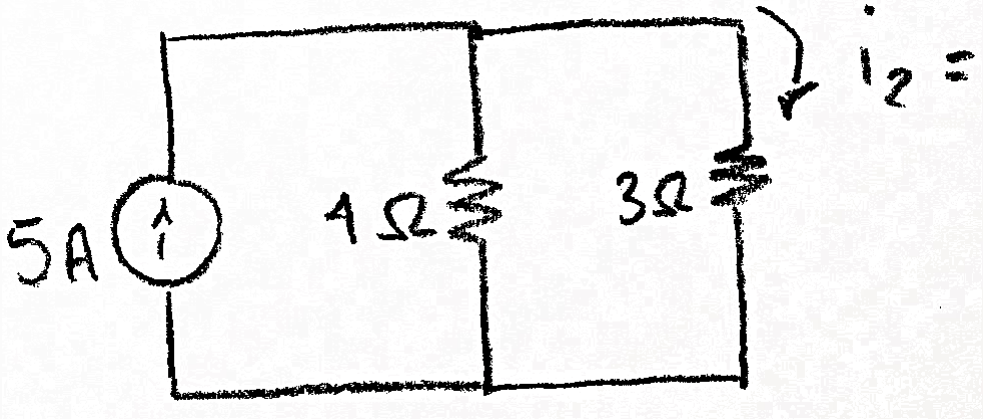
$$V_{10} = 10 \times 5 = 50V$$

$$V_{12} = 12 \times 5 = 60V$$

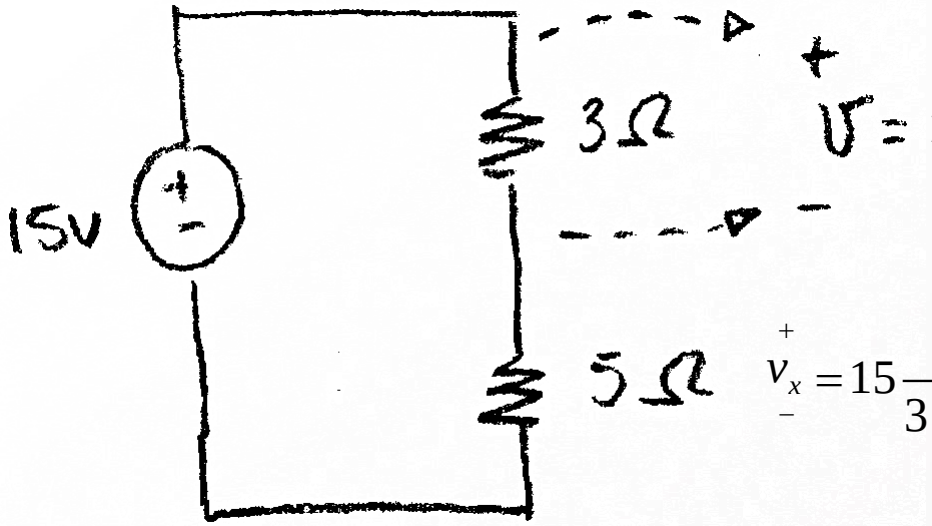
$$i_T = \frac{110}{22} = 5A$$



$$V = 10\frac{4}{4+4} = 5$$

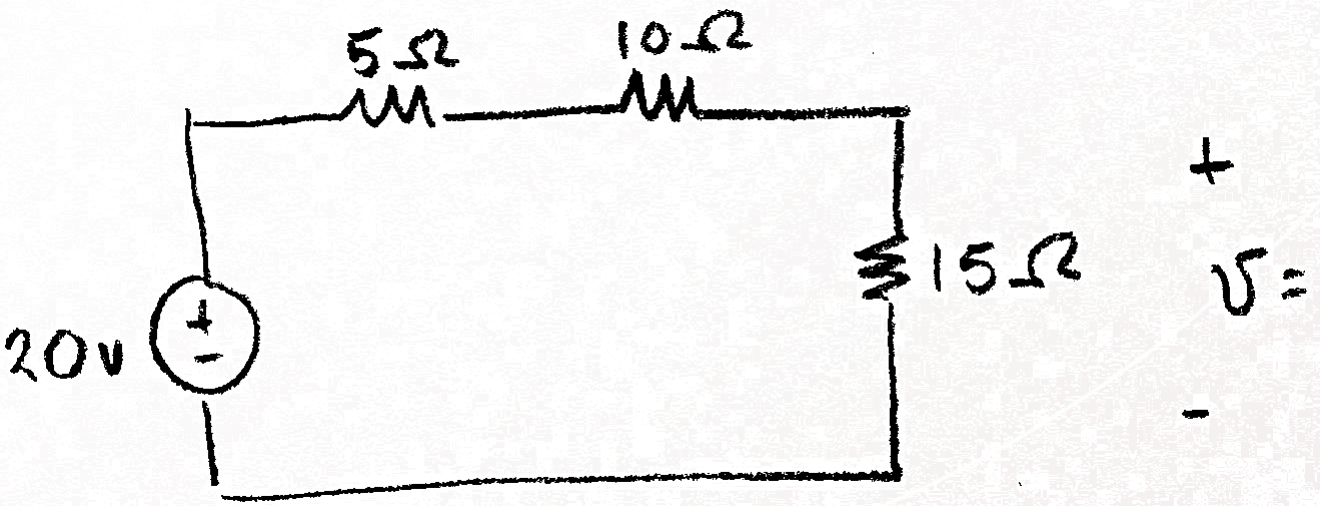


$$i_2 = 5\frac{4}{3+4} = 2.85$$

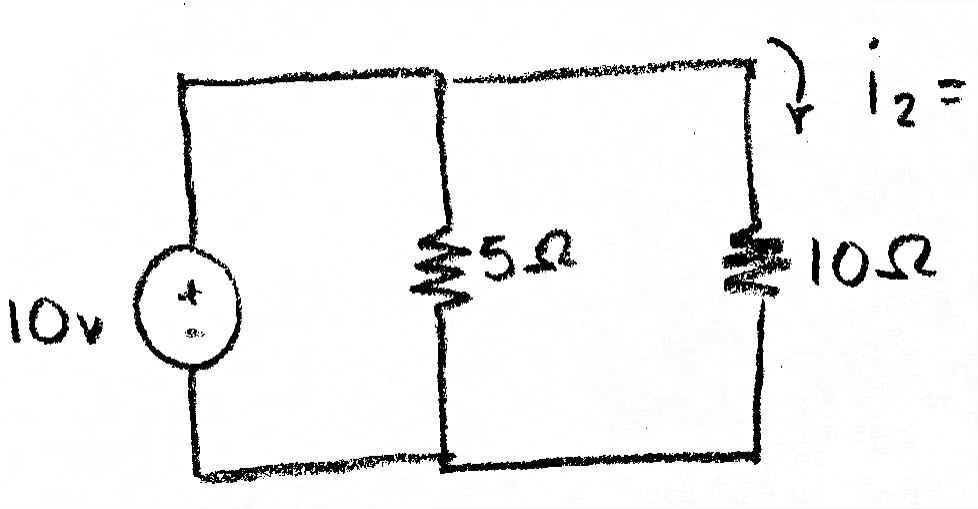


$$v = 15\frac{3}{3+5} = 5.625$$

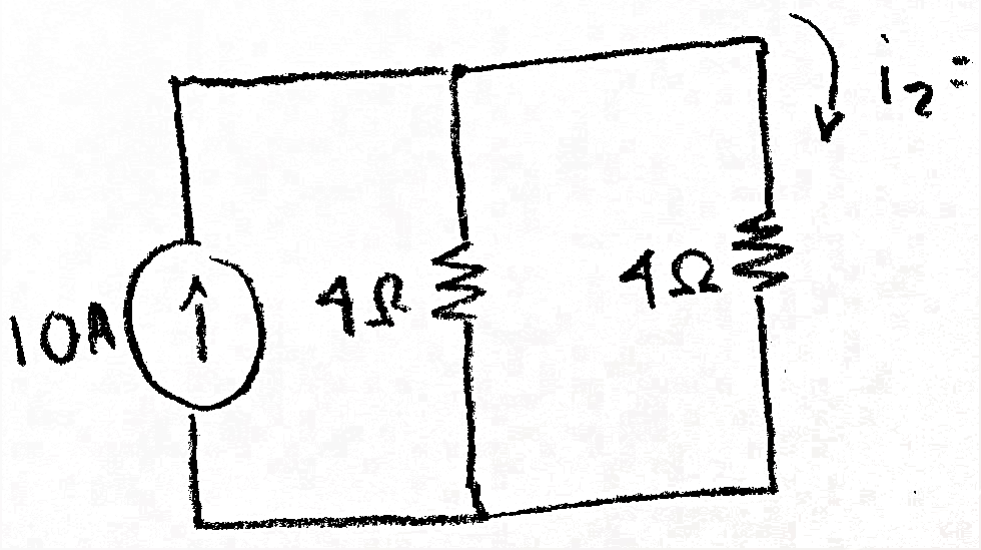
$$v_x = 15\frac{5}{3+5} = 9.375$$



$$v = 20\frac{15}{15+15} = 10$$

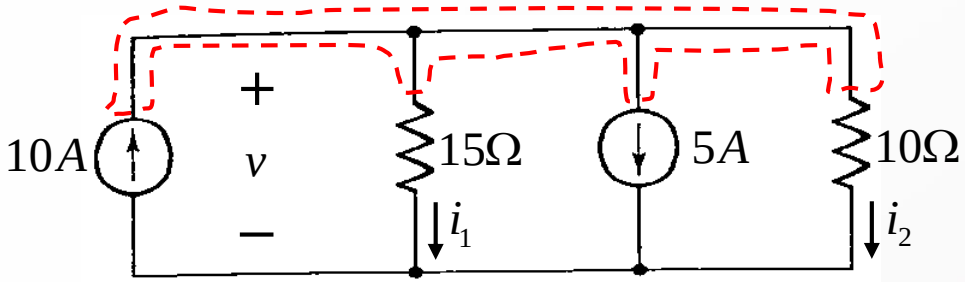


$$i_2 = \frac{10}{10} = 1$$



$$i_2 = 10\frac{4}{4+4} = 5$$

Determine un valor para la tensión v marcada en el circuito

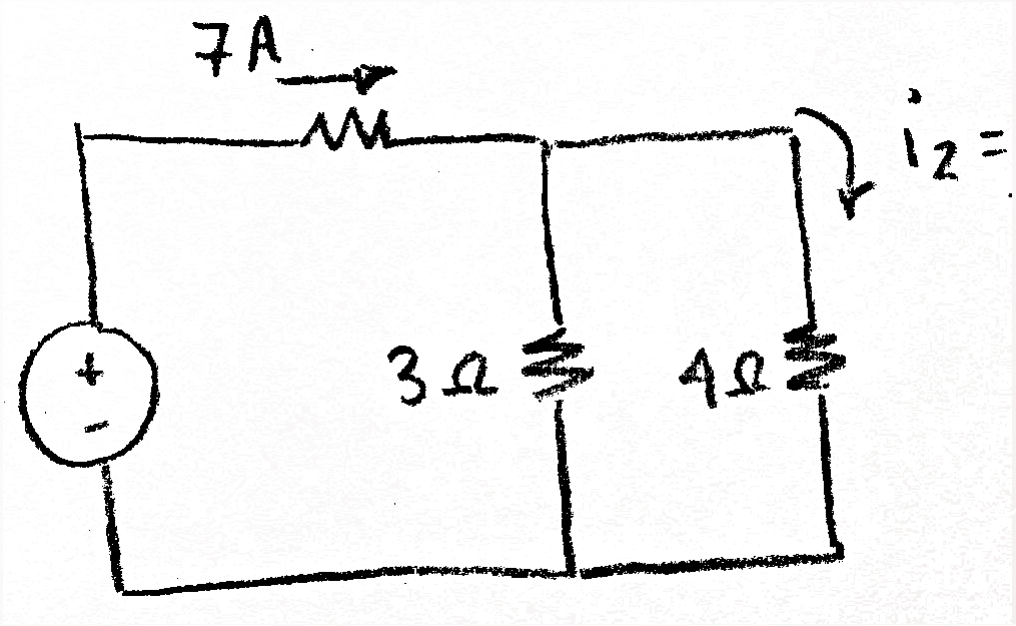


$$10 = i_1 + 5 + i_2$$

$$10 = \frac{v}{15} + 5 + \frac{v}{10}$$

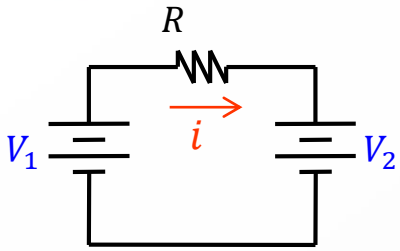
$$5 = v\left(\frac{1}{15} + \frac{1}{10}\right) = v\frac{25}{150} = v\frac{1}{6}$$

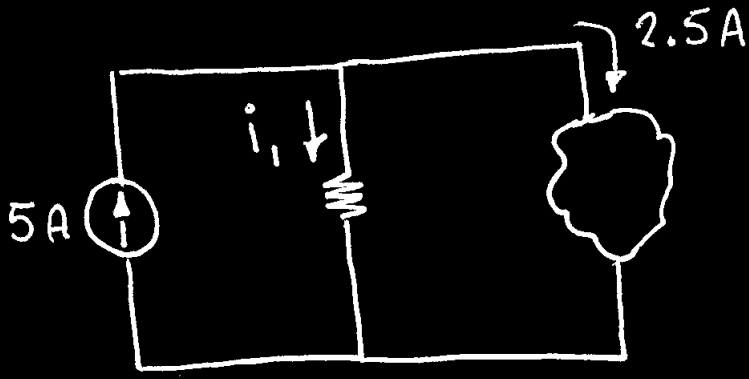
$$v = 30$$

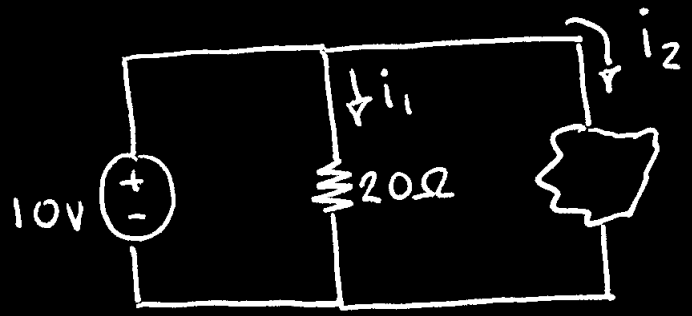


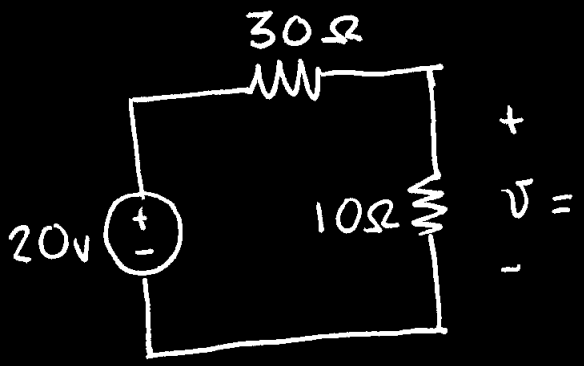
$$i_2 = 7\frac{3}{3+4} = 3$$

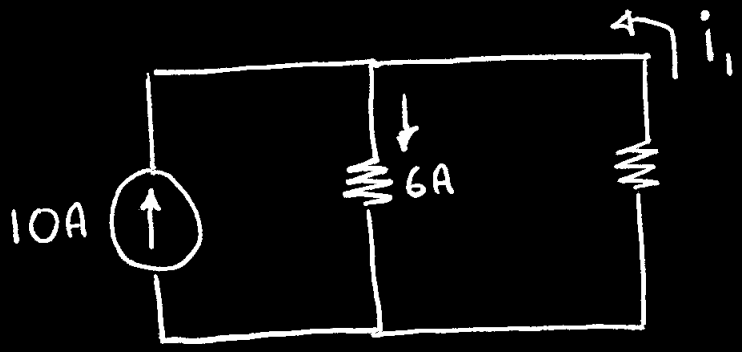
Principio de superposición



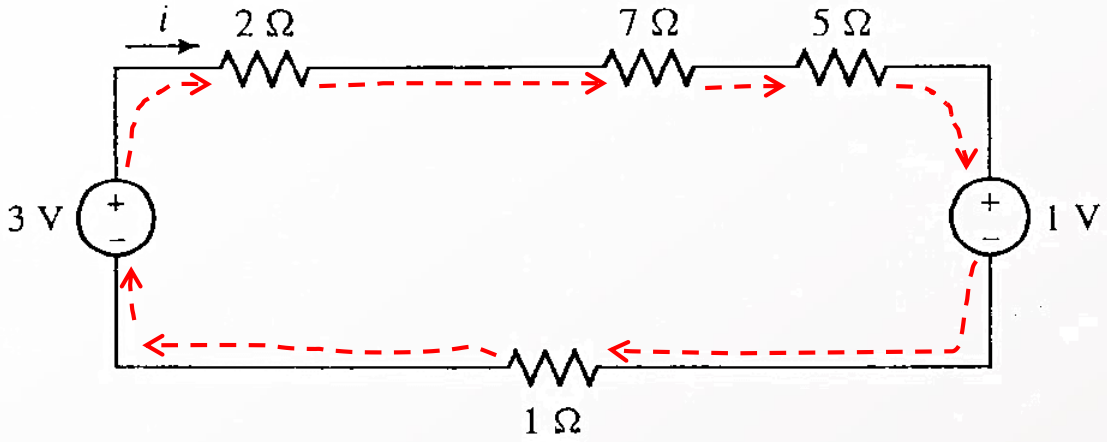





30Ω
20V
10Ω
+
V =
-


10A
6A
i_1

44. (*a*) Simplifique el circuito de la figura 3.82 tanto como sea posible usando combinaciones de fuentes y de resistencias. (*b*) Calcule *i*, usando su circuito simplificado. (*c*) ¿A qué tensión se debe cambiar la fuente de 1 V para reducir *i* a cero? (*d*) Calcule la potencia absorbida por la resistencia de 5 Ω.

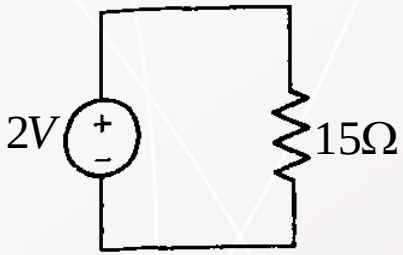


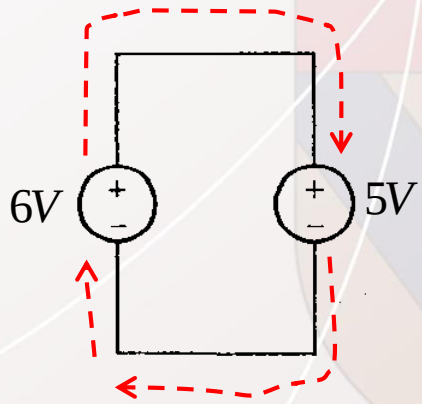
$$-3+2i+7i+5i+1+1i=0$$

$$-3+15i+1=0$$

$$-3+15i+3=0$$

$$i=0$$

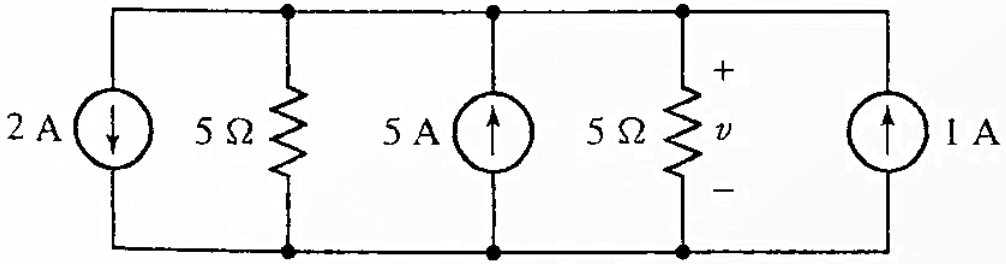


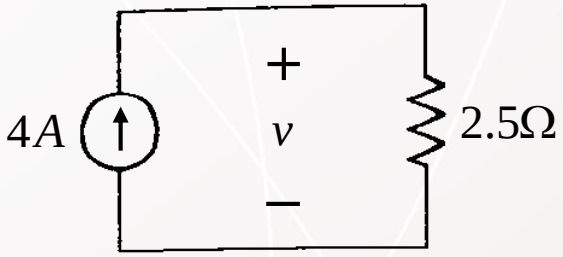


$$-6+5=0$$

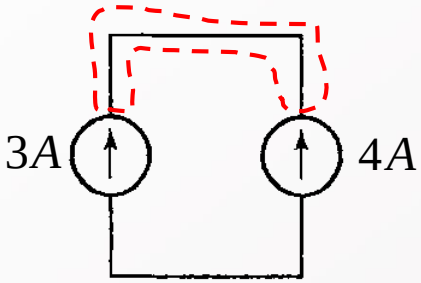
$$5=6$$

45. (*a*) Simplifique el circuito de la figura 3.83 usando combinaciones o reducciones adecuadas de fuentes y resistencias. (*b*) Determine la tensión etiquetada v, usando su circuito simplificado. (*c*) Calcule la potencia suministrada por la fuente de 2 A al resto del circuito.



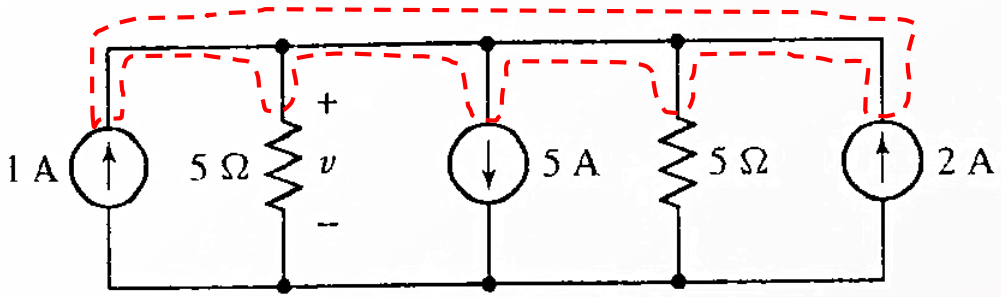


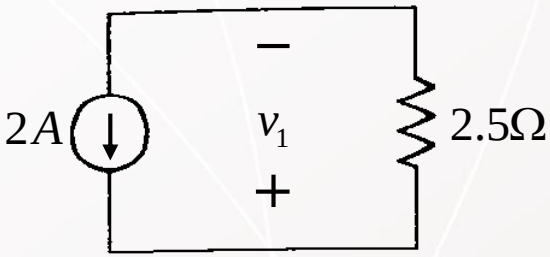
$$v = 4 \times 2.5 = 10$$



$$7 = 0$$

32. Con referencia al circuito representado en la figura 3.71, determine el valor de la tensión v.





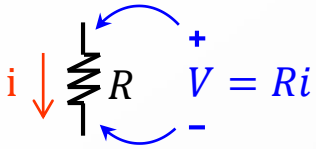
$$1+2=\frac{v}{5}+5+\frac{v}{5}$$

$$-2=\frac{2}{5}v$$

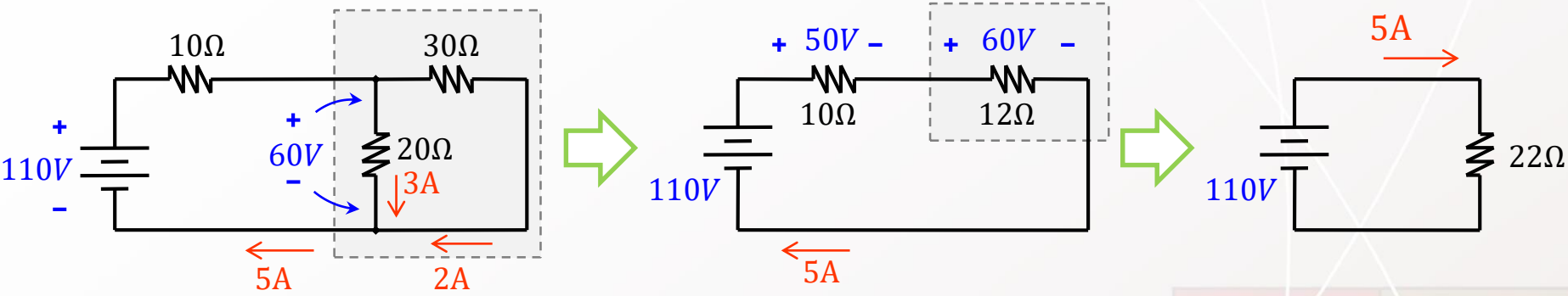
$$v=-5$$

$$v_1=2\times 2.5=5$$

Calculo de corrientes específicas



$$R_s = R_a + R_b \qquad R_p = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} \qquad R_p = \frac{R_a R_b}{R_a + R_b}$$



$$i_{30} = \frac{60}{30} = 2A$$

$$i_{20} = \frac{60}{20} = 3A$$

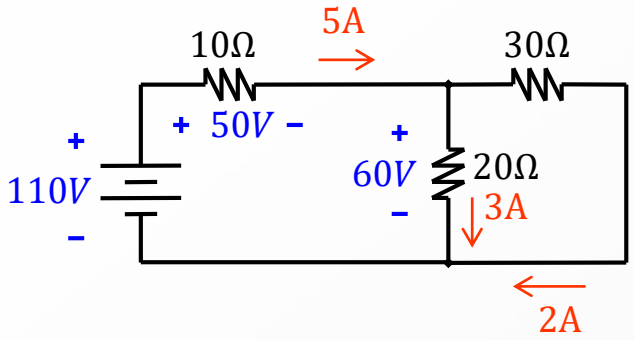
$$R_p = \frac{20 \times 30}{20 + 30} = 12\Omega$$

$$V_{10} = 10 \times 5 = 50V$$

$$V_{12} = 12 \times 5 = 60V$$

$$i_T = \frac{110}{22} = 5A$$

Encuentre la corriente en la resistencia de 30Ω si se sabe que la fuente aporta una corriente de 5A.

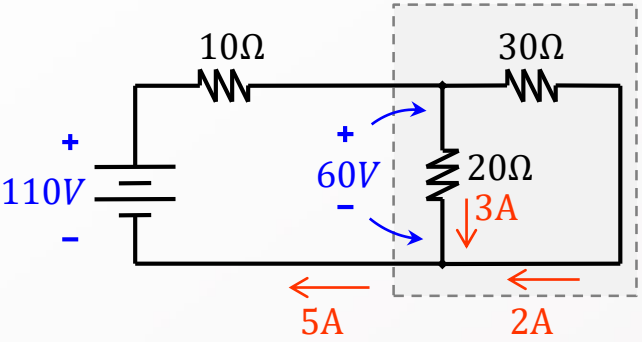


$$V_{10} = 10 \times 5 = 50 \qquad OL$$

$$-110 + 50 + V_{20} = 0 \qquad KVL$$

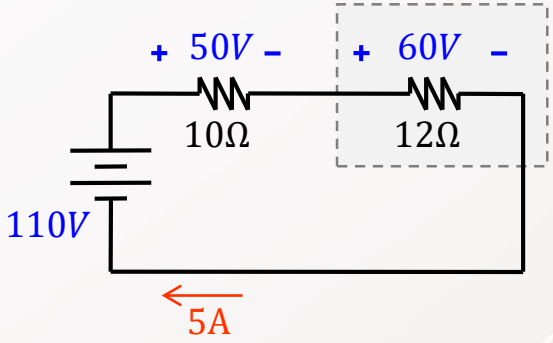
$$I_{R20} = \frac{60}{20} = 3 \qquad OL$$

$$I_{R30} = \frac{60}{30} = 2 \qquad OL$$



$$i_{30} = \frac{60}{30} = 2A$$

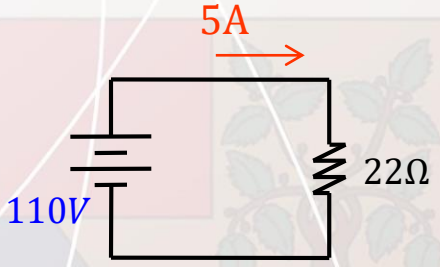
$$i_{20} = \frac{60}{20} = 3A$$



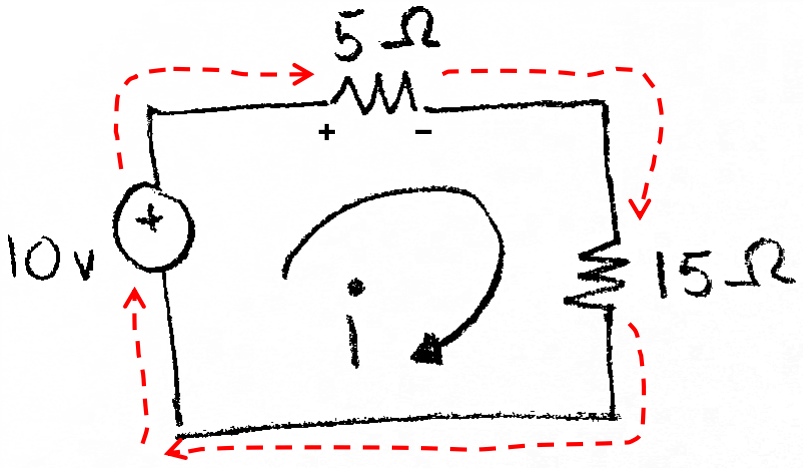
$$R_p = \frac{20 \times 30}{20 + 30} = 12\Omega$$

$$V_{10} = 10 \times 5 = 50V$$

$$V_{12} = 12 \times 5 = 60V$$



$$i_T = \frac{110}{22} = 5A$$

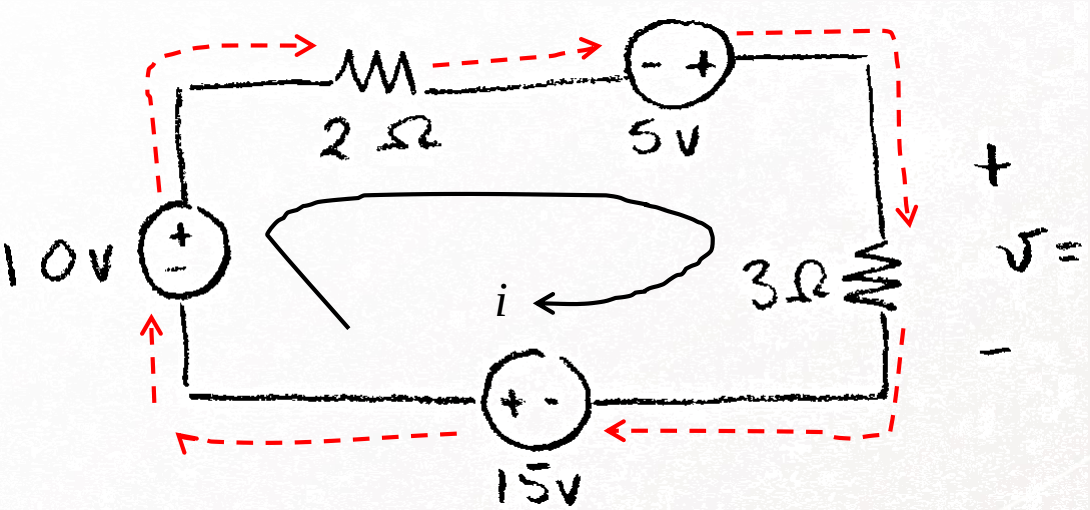


$$-10 + 5i + 15i = 0$$

$$20i = 10$$

$$i = 0.5$$

$$+ \quad v = 15i = 7.5 \quad -$$



$$-10 + 2i - 5 + 3i - 15 = 0$$

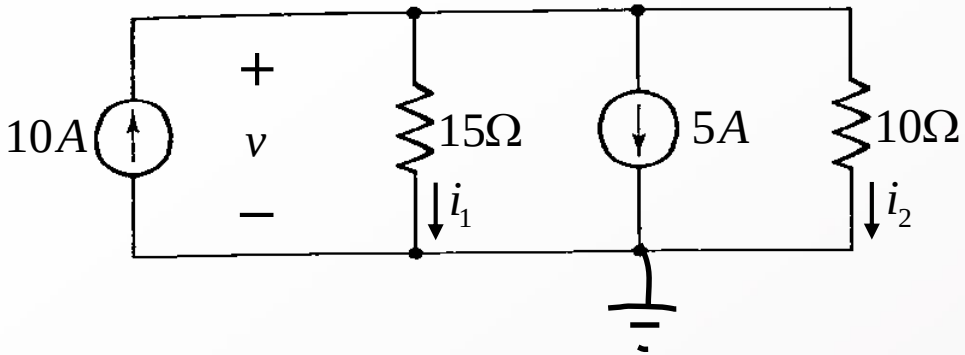
$$-30 + 5i = 0$$

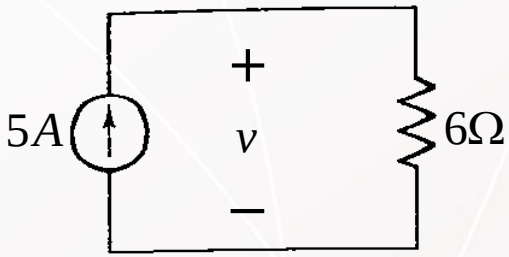
$$5i = 30$$

$$i = \frac{30}{5} = 6$$

$$+ \quad v = 3i = 18 \quad -$$

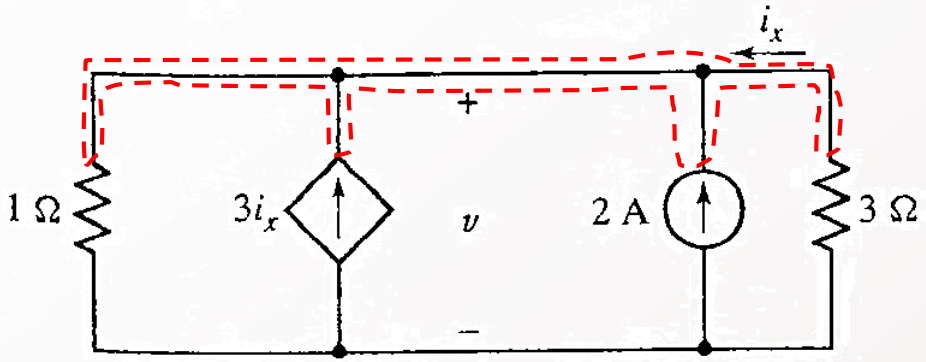
Determine un valor para la tensión v marcada en el circuito





$$5 = \frac{v}{6}$$

33. Determine la tensión v etiquetada en la figura



$$i_x + 3i_x + 2 = \frac{v}{1}$$

$$4i_x + 2 = v$$

$$4i_x + 2 = -3i_x$$

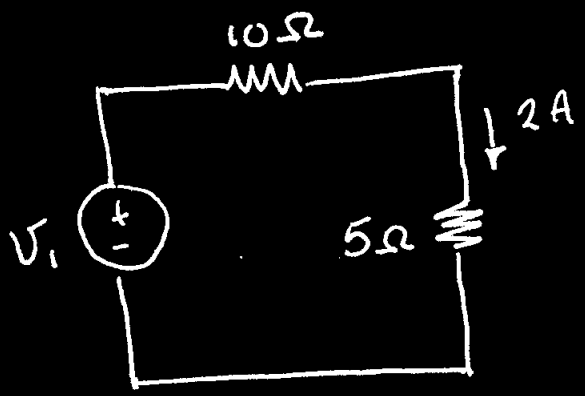
$$7i_x + 2 = 0$$

$$i_x = -\frac{2}{7}$$

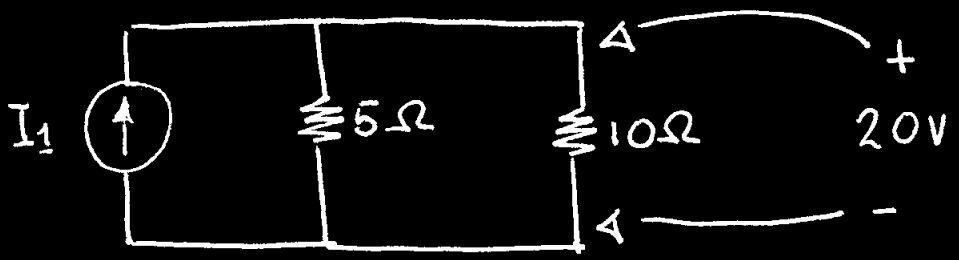
$$i_x = -\frac{v}{3}$$

$$v = -3i_x$$

$$v = \frac{6}{7}$$



$V_1 =$



$I_1 =$

Determine la corriente en la resistencia de 4Ω