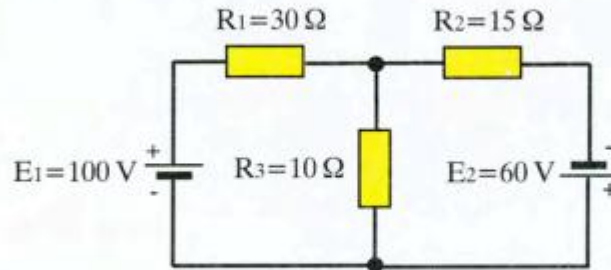


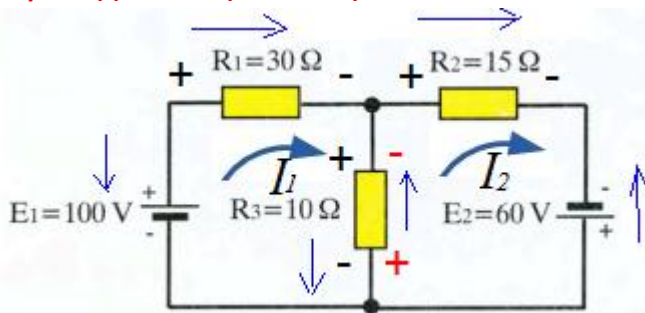
8. Στο κύκλωμα του σχήματος να υπολογιστεί το ρεύμα που διέρχεται από την αντίσταση  $R_3$  εφαρμόζοντας το θεώρημα της υπέρθεσης.



Απ: 0,1 A

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α' τρόπος (Μέθοδος Kirchhoff)



$$\left. \begin{aligned} -E_1 + R_1 I_1 + R_3 I_1 - R_3 I_2 &= 0 \\ -E_2 + R_2 I_2 + R_3 I_2 - R_3 I_1 &= 0 \end{aligned} \right\} \Rightarrow$$

$$\left. \begin{aligned} -E_1 + (R_1 + R_3) I_1 - R_3 I_2 &= 0 \\ -E_2 + (R_2 + R_3) I_2 - R_3 I_1 &= 0 \end{aligned} \right\} \Rightarrow$$

$$\left. \begin{aligned} -100 + (30 + 10) I_1 - 10 I_2 &= 0 \\ -60 + (15 + 10) I_2 - 10 I_1 &= 0 \end{aligned} \right\} \Rightarrow$$

$$\left. \begin{aligned} -100 + 40 I_1 - 10 I_2 = 0 \Rightarrow I_1 &= \frac{100 + 10 I_2}{40} = 2,5 + 0,25 I_2 \\ -60 + 25 I_2 - 10 I_1 &= 0 \end{aligned} \right\} \Rightarrow$$

$$\left. \begin{aligned} I_1 &= 2,5 + 0,25 I_2 \\ -60 + 25 I_2 - 10(2,5 + 0,25 I_2) &= 0 \end{aligned} \right\} \Rightarrow$$

$$\left. \begin{aligned} I_1 &= 2,5 + 0,25 I_2 \\ -60 + 25 I_2 - 25 - 2,5 I_2 &= 0 \Rightarrow 22,5 I_2 = 85 \Rightarrow I_2 = \frac{85}{22,5} = 3,77 A \end{aligned} \right\} \Rightarrow$$

$$\left. \begin{aligned} I_1 &= 2,5 + 0,25(3,7) = 3,42A \\ I_2 &= 3,77A \end{aligned} \right\} \Rightarrow$$

$$I_3 = I_1 - I_2 = 3,42 - 3,77 = -0,35A$$

**β' τρόπος (Μέθοδος επαλληλίας)**

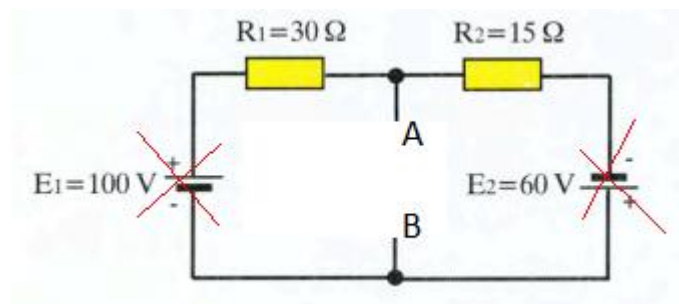
$R_{o\lambda} = \frac{30 \cdot 10}{30 + 10} + 15 = 22,5 \Omega$   
 $I = E_2 / R_{o\lambda} = 60 / 22,5 = 2,66A$   
 $I_3 = \frac{30}{30 + 10} \cdot 2,66 = 1,99A$

Απ: 0,1 A

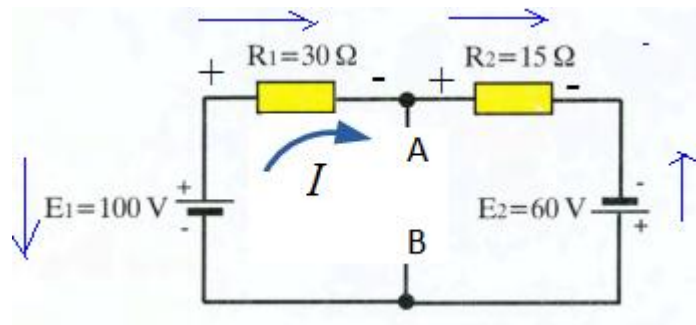
$R_{o\lambda} = \frac{15 \cdot 10}{15 + 10} + 30 = 36 \Omega$   
 $I = E / R_{o\lambda} = 100 / 36 = 2,77A$   
 $I_3 = \frac{15}{10 + 15} \cdot 2,77 = 1,662A$

$I_3 = I_3 + I_3 = 1,66 - 1,99 = -0,33A$

**γ' τρόπος (Μέθοδος Thevenin)**



$$R_{Th} = R_{AB} = \frac{30 \cdot 15}{30 + 15} = \frac{450}{45} = 10 \Omega$$

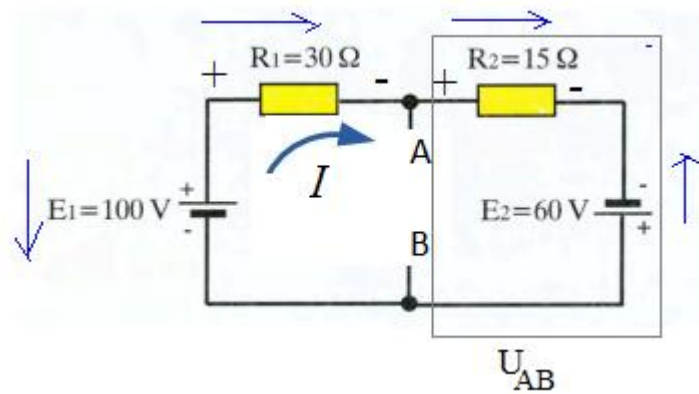


$$-E_1 + R_1 I + R_2 I - E_2 = 0 \Leftrightarrow$$

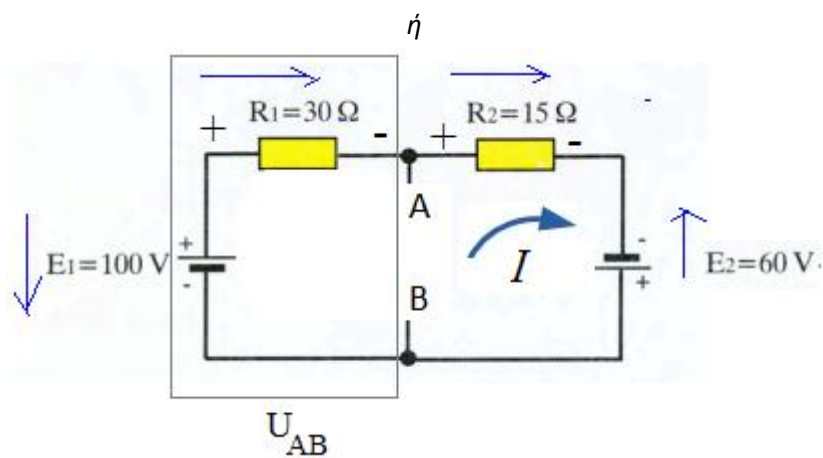
$$-E_1 + (R_1 + R_2) I - E_2 = 0 \Leftrightarrow$$

$$-100 + (30 + 15) I - 60 = 0 \Leftrightarrow$$

$$45 I = 160 \Rightarrow I = \frac{160}{45} = 3,55 A$$

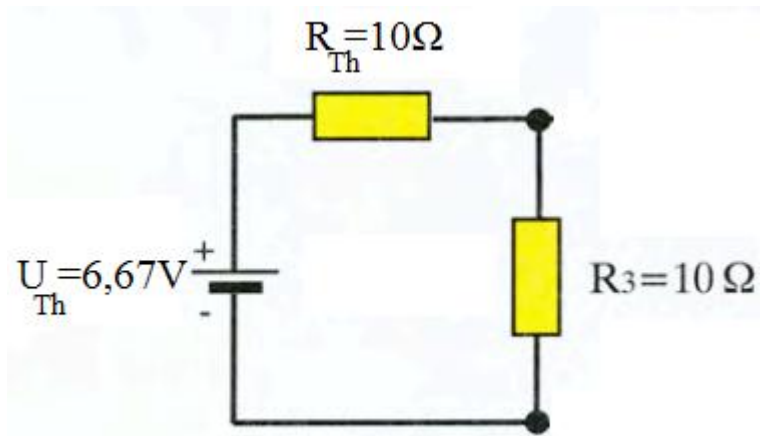


$$U_{Th} = U_{AB} = E_1 - R_1 I = 100 - 30 * 3,55 = 100 - 106,5 = -6,5 V$$



$$U_{Th} = U_{AB} = E_2 - R_2 I = 60 - 15 * 3,55 = 60 - 53,25 = 6,75 V$$

Ισοδύναμο κύκλωμα Thevenin



$$I = \frac{U_{Th}}{R_{Th} + R_3} = \frac{6,67}{10 + 10} = 0,33A$$