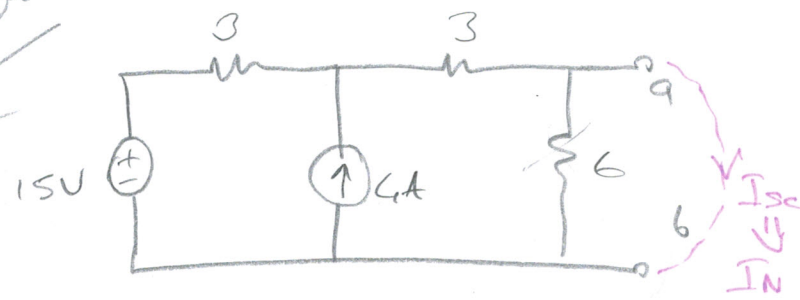
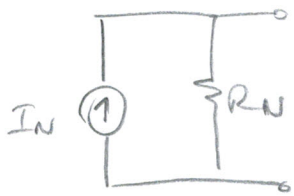
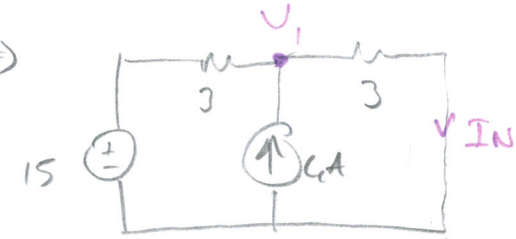
Örnek



ab uçlarından bakıldığında görünen Norton eşdeğer devresi nedir



$I_N \Rightarrow$



$$\frac{V_1 - 15}{3} - 4 + \frac{V_1}{3} = 0$$

$$\Rightarrow V_1 - 15 + V_1 = 12$$

$$2V_1 = 27$$

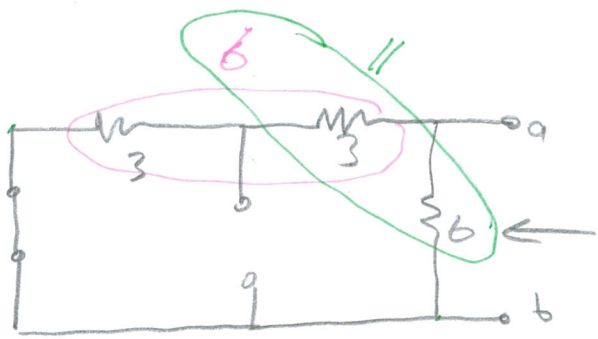
$$V_1 = \frac{27}{2}\ V$$

$$I_N = \frac{V_1}{3}$$

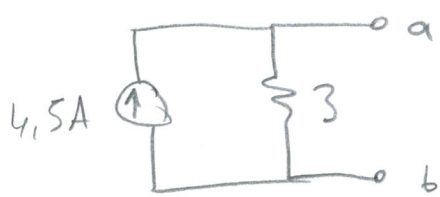
$$= \frac{\frac{27}{2}}{3}$$

$$= 4{,}5A$$

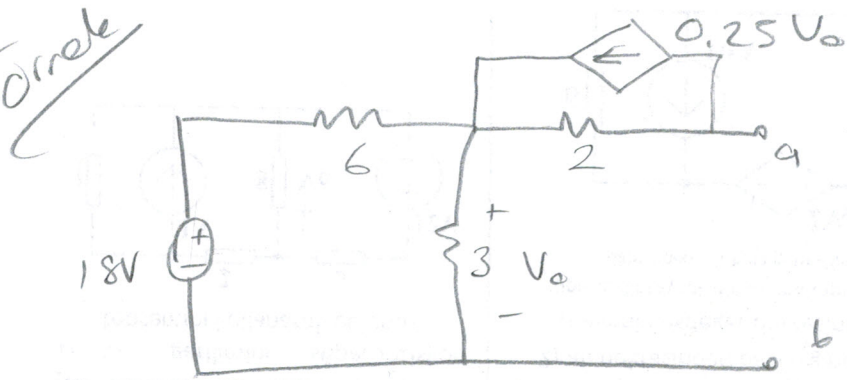
$R_N \Rightarrow$



$$R_N = \frac{6.6}{12} = 3\ \Omega$$



Örnek



Norton eşdeğer devresi?

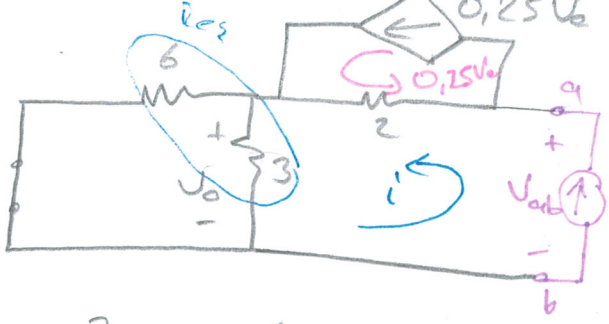
R_N ?$= R_{Th}$

I_N =? $= I_{sc}$

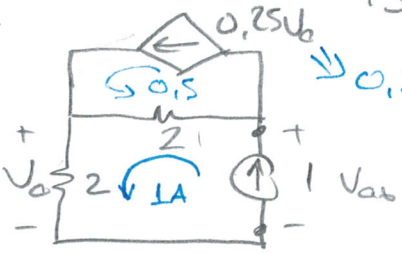
1.yol

R_{Th}

R_N $\Rightarrow$



$\Rightarrow$



$$2_{eş} = \frac{6.3}{8} = 2\,\Omega \qquad i = 1A$$

$$V_o = 2.1 = 2V$$

$$-V_{ab} + 2(1-0,5) + 2.1 = 0$$

$$V_{ab} = 3V$$

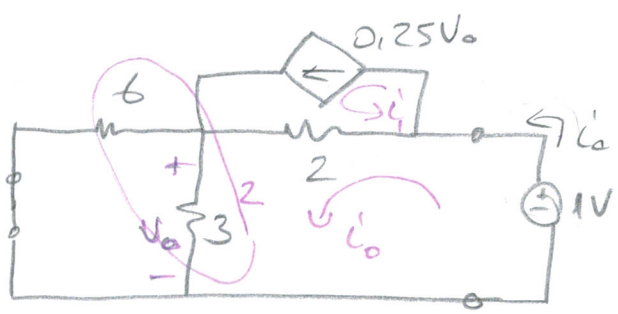
$R_{Th} = \frac{1V}{i_o}$

Thevenin için böyleydi:

$\rightarrow R_N = \frac{V_{ab}}{1A} = \frac{3}{1} = 3\,\Omega$

Norton için 1A'lik kaynak bağlandığında

2.yol



$$i_1 = 0,25\,V_o$$

$$-1 + 2(i_o - i_1) + 2i_o = 0$$

$$4i_o = 1 + 2i_1$$

$$4i_o = 1 + 0,5V_o$$

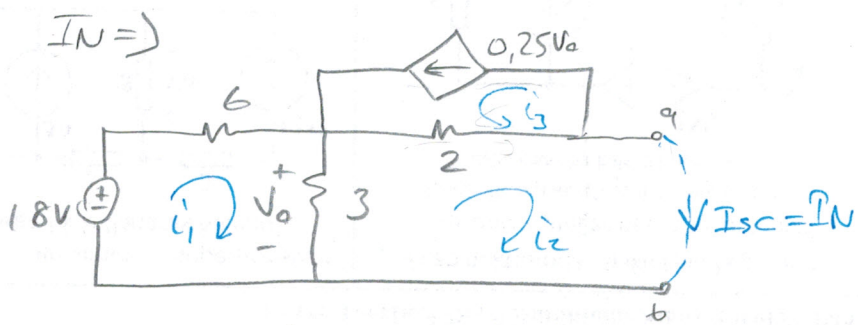
$$4i_o = 1 + 1i_o$$

$$i_o = 1/3\,A$$

$$V_o = 2i_o$$

$$R_N = \frac{1V}{i_o} = \frac{1}{1/3} = 3\,\Omega$$

3.yol $I_N \Rightarrow$



$$V_o = 3(i_1 - i_2)$$

Göz 1 → $-18 + 6i_1' + 3(i_1' - i_2) = 0$

Göz 2 ⇒ $3(i_2 - i_1') + 2(i_2 + i_3) = 0$

Göz 3 ⇒ $i_3 = 0{,}25\,V_o$

$6i_1' + 3i_1' - 3i_2 = 18$

$9i_1' - 3i_2 = 18$

$3i_1' - i_2 = 6$

$3i_2 - 3i_1' + 2i_3' + 2i_2 = 0$

$5i_2 - 3i_1' = -2i_3'$

$5i_2 - 3i_1' = -0{,}5\,V_o$

$5i_2 - 3i_1' = -0{,}5(3i_1' - 3i_2)$

$5i_2 - 3i_1' = -1{,}5i_1' + 1{,}5i_2$

$3{,}5i_2 = 1{,}5i_1'$

$7i_2 = 3i_1'$

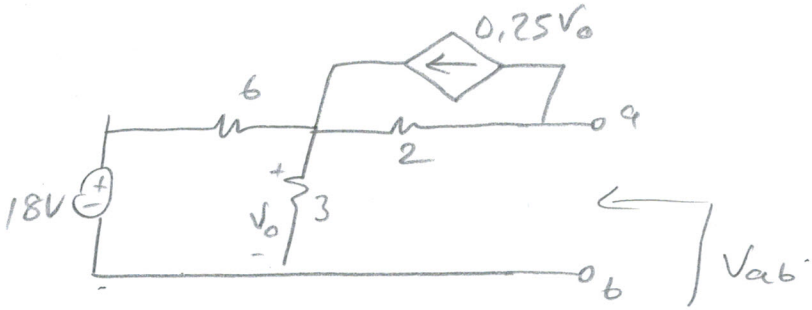
$7i_2 - i_2 = 6$

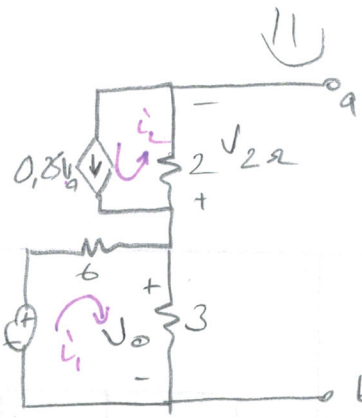
$i_2 = 1A$

$I_{SC} = I_N = i_2 = 1A$

$R_N \Rightarrow$

$$R_N = \frac{V_{ab}}{I_N} = \frac{V_{ab}}{I_{SC}}$$





$i_2 = 0{,}25V_o$

$-18 + 6i_1' + 3i_1' = 0$

$i_1' = 2A$

$V_o = i_1' \cdot 3 = 2 \cdot 3 = 6V$

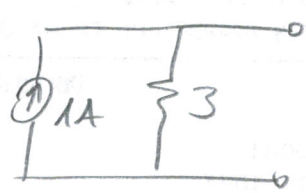
$i_2 = 0{,}25 \cdot 6 = 1{,}5A$

$V_{2\Omega} = i_2 \cdot 2$

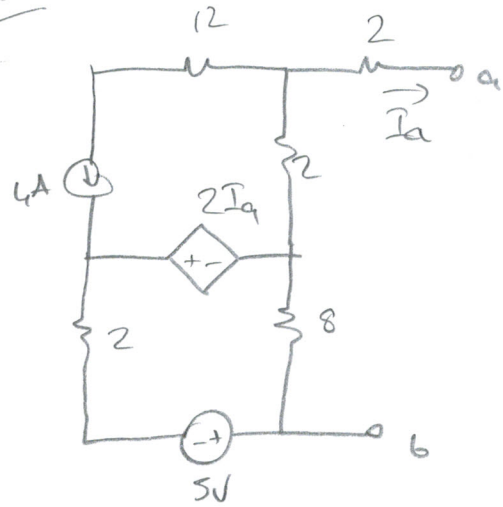
$= 1{,}5 \cdot 2 = 3V$

$V_{ab} = V_{2\Omega} + V_o = -3 + 6 = 3V$

$$R_N = \frac{V_{ab}}{I_N} = \frac{3}{1} = 3\Omega$$



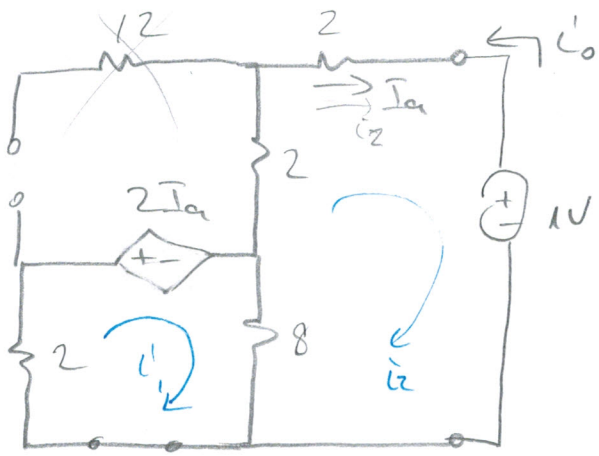
Örnek



Thevenin eşdeğer devresini bulun.

R_{Th} V_{Th}

R_{Th} →



- $I_a = i'_2$
- $2i'_1 + 2I_a + 8(i'_1 - i'_2) = 0$

$$2i'_1 + 2i_2 + 8i'_1 - 8i_2 = 0$$

$$10i'_1 = 6i_2$$

$$5i'_1 = 3i_2$$

$$i'_1 = \frac{3}{5} i_2$$

$$8(i_2 - i'_1) + 2i_2 + 2i_2 + 1 = 0$$

$$12i_2 + 1 = 8i'_1$$

$$12i_2 - 8.\frac{3}{5} i_2 = -1$$

$$60i_2 - 24i_2 = -5$$

$$36i_2 = -5$$

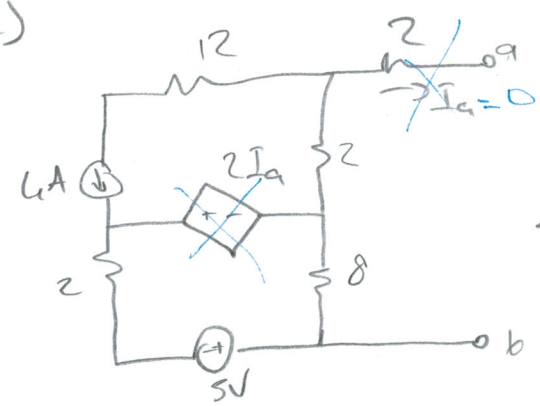
$$i_2 = -5/36$$

$$i'_2 = -i'_o$$

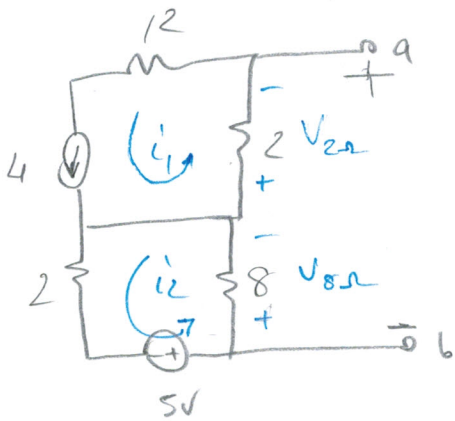
$$i'_o = 5/36 \text{ A}$$

$$R_{Th} = \frac{1V}{i'_o} = \frac{1}{\frac{5}{36}} = \frac{36}{5} = 7,2$$

V_{Th} =)



$V_{ab} = V_{Th}$



$i_1' = 4A$

$2i_2 - 5 + 8i_2 = 0$

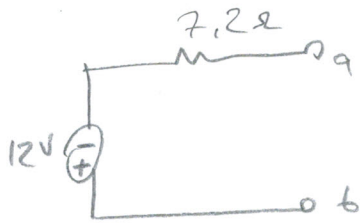
$10i_2 = 5$

$i_2 = 0,5A$

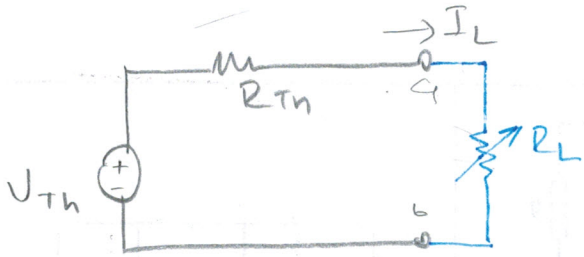
$V_{ab} = -(V_{2\Omega} + V_{8\Omega})$

$= -(4.2 + 0,5.8)$

$= -12V$

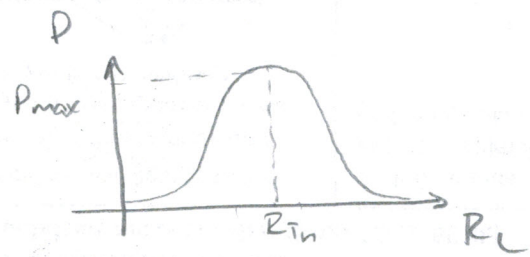


4) Maksimum Güç Transferi:



$P_L = I_L^2 \cdot R_L$

$= \left(\frac{V_{Th}}{R_{Th}+R_L}\right)^2 \cdot R_L$



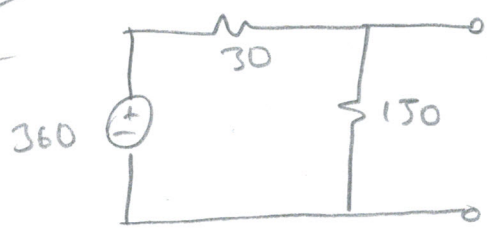
Örnek $V_{Th} = 10$
$R_{Th} = 5$
Sabit değerler

i) $R_L = 3$ $\quad P_L = \left(\frac{10}{8}\right)^2 \cdot 3 = 4,68W$

ii) $R_L = 5$

iii) $R_L = 6$ $\quad P_L = 4,95$

Örnek

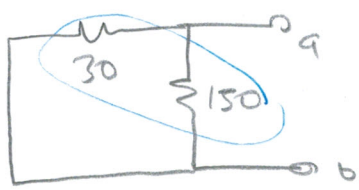


a) Maksimum güç transferi için yani devreden max gücü çekebilmek için yük direnci =?

b) P_L =?

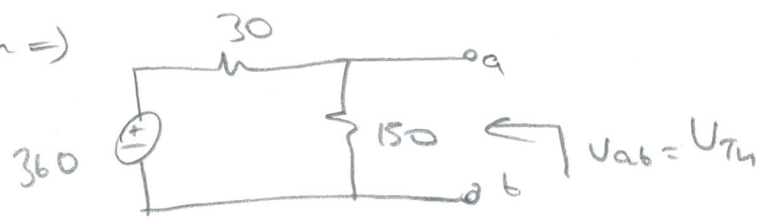
a) Thevenin: bulalım

R_{Th} ⇒



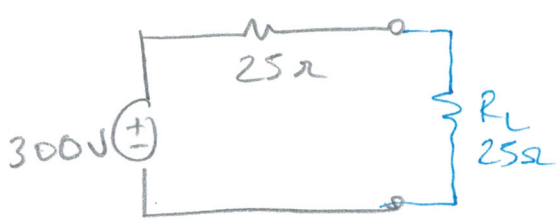
$R_{ab} = R_{Th} = \frac{150 \cdot 30}{180} = 25\,\Omega$

V_{Th} ⇒



$V_a = V_{Th} = \frac{360}{30+150} \cdot 150$

$= 300\,V$



$R_L = R_{Th} = 25\,\Omega$ olduğunda devreden max güç elde edilir.

b) $P_L = I_L^2 \cdot R_L = \left(\frac{300}{25+25}\right)^2 \cdot 25 = 900\,W$