Háskóli Íslands
Verkfræðideild
Rafmagns- og tölvuverkfræðiskor

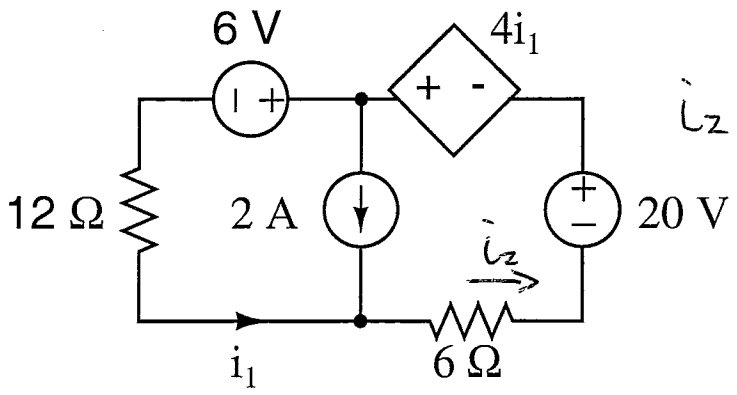
Vor 2008

08.31.01 Greining Rása

Miðsvetrarpróf I

11. febrúar 2008 kl. 10:50 – 12:20 árdegis

1. (20) Finna skal i_1.



$i_2 = i_1 + 2$

$$0 = 6 + 6(i_1 + 2) + 12i_1 - 4i_1 - 20$$

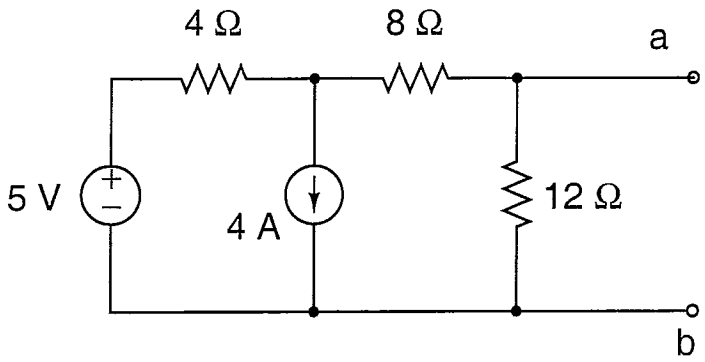
eða

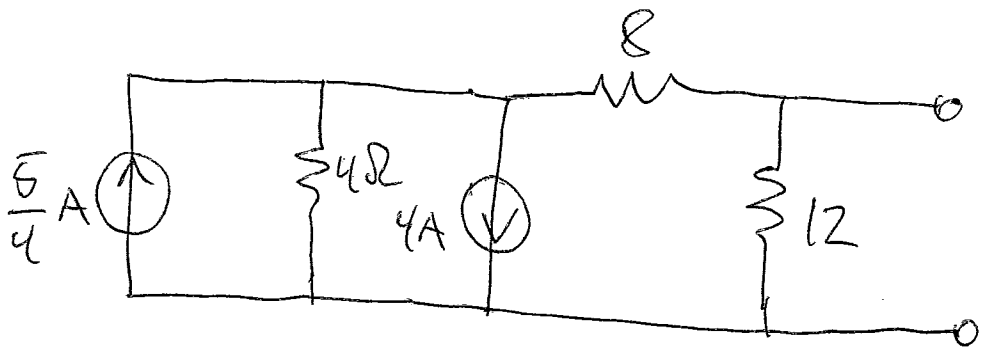
$$0 = 6 + 6i_1 + 12 + 8i_1 - 20$$

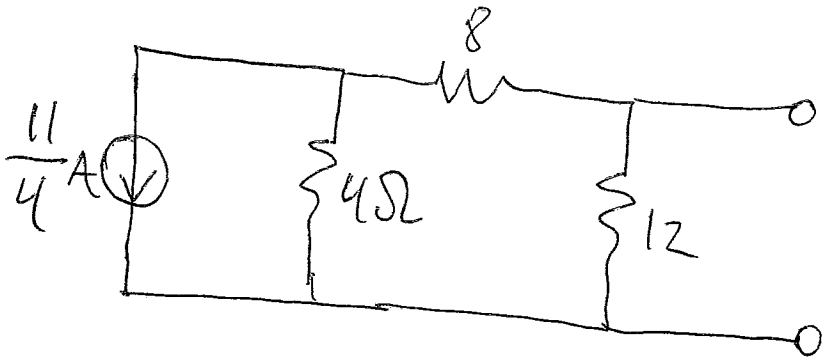
eða

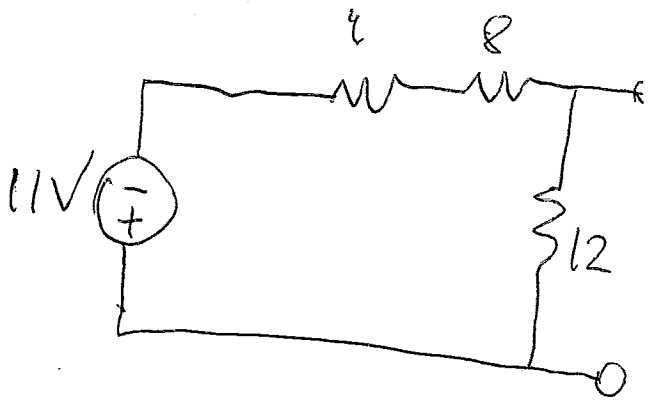
$$0 = -2 + 14i_1 \quad \text{eða} \quad i_1 = \frac{1}{7}\,\text{A}$$

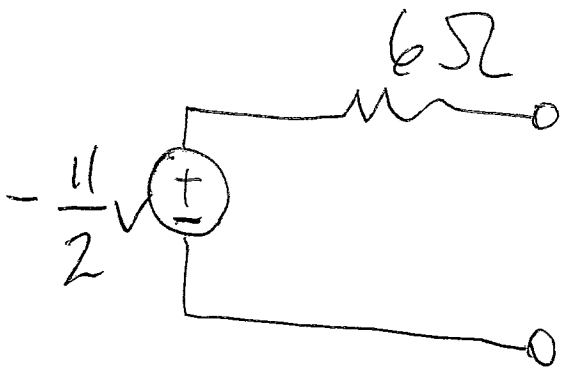
2. (20) Finnið Thévenin rásina á milli pólanna a og b.







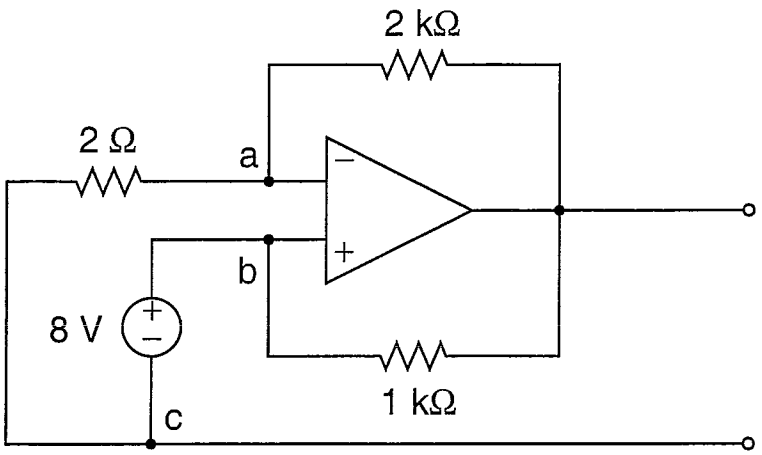




$$\frac{11}{12}\,A \cdot 6\Omega = \frac{66}{12} = \frac{33}{6}$$

$$= \frac{11}{2}\,V$$

3. (30) Finna jafngildisviðnámið milli pólanna b og c. Gerið ráð fyrir að aðgerðarmagnarinn sé fullkominn. Sýna útreikninga.



$$V^+ = V^- = V_a = V_b = 8\,V = V_s$$

$$\frac{V_o - V_a}{2k} + \frac{0 - V_a}{2} = 0$$

og

$$i_b = \frac{V_b - V_o}{1k} = \frac{V_a - V_o}{1k} = -8\,A$$

þar sem

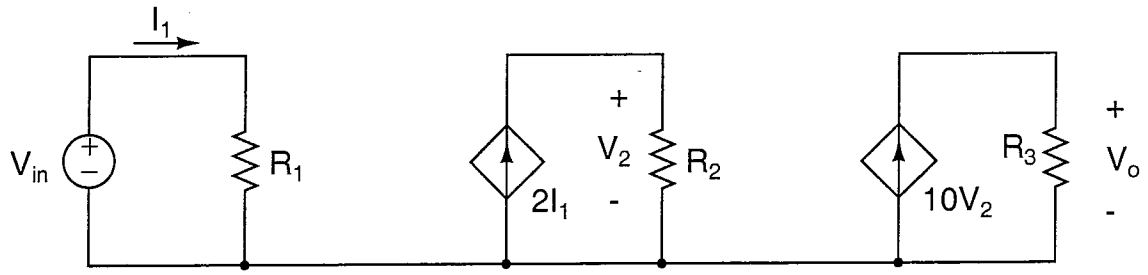
$$V_a - V_o = -\frac{V_a}{2}\,2k = -8000$$

svo

$$\frac{V_a}{i_b} = R_{eq} = \frac{8}{-8} = -1\,\Omega$$

3

4. (10) Finna skal viðnámsgildið á R_2 þannig að mögnun rásarinnar V_o/V_{in} sé 60. Gefið er að $R_1 = 15\ \Omega$ og $R_3 = 45\ \Omega$.



$$I_1 = \frac{V_{in}}{R_1} \quad \text{og} \quad V_2 = 2I_1 R_2$$

svo

$$V_2 = 2\frac{V_{in}}{R_1} R_2$$

og

$$V_o = 10 V_2 R_3 = 10 \cdot 2 \frac{V_{in}}{R_1} R_2 R_3$$

b.a

$$\frac{V_o}{V_{in}} = 20 \frac{R_2 R_3}{R_1} = 20 \cdot R_2 \frac{45}{15} = 60 R_2$$

svo

$$R_2 = 1\,\Omega$$