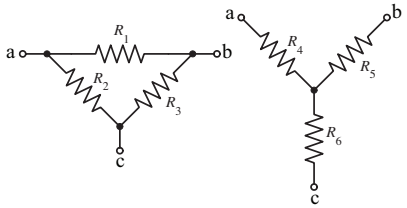
Solution of ECE 300 Test 4 S09

1. If the two networks below are equivalent at terminals a, b and c, find the numerical value of R_5.

$$R_5 = \frac{R_1 R_3}{R_1 + R_2 + R_3} = \frac{500\Omega^2}{80\Omega} = 6.25\Omega$$

$R_1 = 10\Omega$, $R_2 = 20\Omega$, $R_3 = 50\Omega$



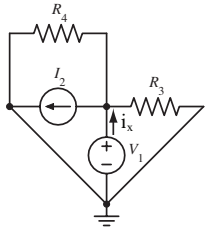
2. Find the numerical value of i_x

$i_x = 2\text{A}$

$$i_x = \frac{10\text{V}}{6\Omega \parallel 4\Omega} = \frac{10\text{V}}{2.4\Omega} = 4.167\text{A}$$

$V_1 = 10\text{V}$, $I_2 = 2\text{A}$

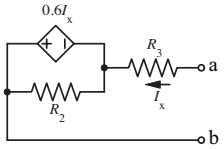
$R_3 = 4\Omega$, $R_4 = 6\Omega$



3. Find the numerical values of the Thevenin equivalent voltage and resistance at terminals a and b.

V_{TH} is zero because there are no independent sources in the circuit. Apply a 1A source to the terminals flowing into a. Then $I_x = 1\text{A}$ and $0.6I_x = 0.6\text{V}$. So the voltage between a and b (a at positive polarity) is $-0.6\text{V} + 20\Omega \times 1\text{A} = 19.4\text{V}$ and therefore $R_{TH} = 19.4\Omega$.

$R_2 = 50\Omega$, $R_3 = 20\Omega$

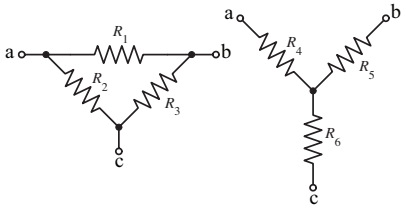


Solution of ECE 300 Test 3 S09

1. If the two networks below are equivalent at terminals a, b and c, find the numerical value of R_5.

$$R_5 = \frac{R_1 R_3}{R_1 + R_2 + R_3} = \frac{500\Omega^2}{130\Omega} = 3.846\Omega$$

$R_1 = 10\Omega$, $R_2 = 70\Omega$, $R_3 = 50\Omega$



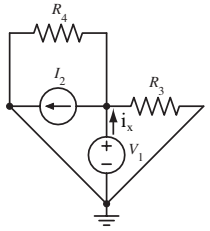
2. Find the numerical value of i_x

(a) Due to the current source alone. $i_x = 3\text{A}$

(b) Due to the voltage source alone. $i_x = \dfrac{10\text{V}}{12\Omega \parallel 4\Omega} = \dfrac{10\text{V}}{3\Omega} = 3.333\text{A}$

$V_1 = 10\text{V}$, $I_2 = 3\text{A}$

$R_3 = 4\Omega$, $R_4 = 12\Omega$



3. Find the numerical values of the Thevenin equivalent voltage and resistance at terminals a and b.

V_{TH} is zero because there are no independent sources in the circuit. Apply a 1A source to the terminals flowing into a. Then $I_x = 1\text{A}$ and $0.6I_x = 0.6\text{V}$. So the voltage between a and b (a at positive polarity) is $-0.6\text{V} + 35\Omega \times 1\text{A} = 34.4\text{V}$ and therefore $R_{TH} = 34.4\Omega$.

$R_2 = 50\Omega$, $R_3 = 35\Omega$