Read Sections Sections 4.1–6 and 4.8 in Alexander & Sadiku.

1. Redo Example 4.4 in Alexander & Sadiku for the following component values: $20\,\text{V} \rightarrow V_1 =$ V, $4\,\text{A} \rightarrow I_1 =$ mA, $1\,\Omega \rightarrow R_1 =$ kΩ, $2\,\Omega \rightarrow R_2 =$ kΩ, $3\,\Omega \rightarrow R_3 =$ kΩ, $4\,\Omega \rightarrow R_4 =$ kΩ and $5\,\Omega \rightarrow R_5 =$ kΩ.

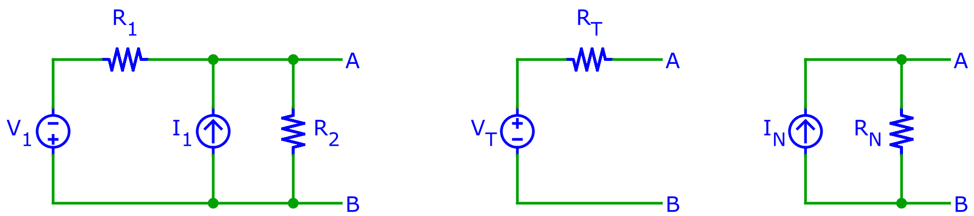
   $i_o =$ ____ 4 pts. 0

2. Redo Example 4.8 in Alexander & Sadiku for the following component values: $32\,\text{V} \rightarrow V_1 =$ V, $2\,\text{A} \rightarrow I_1 =$ mA, $1\,\Omega \rightarrow R_1 =$ kΩ, $4\,\Omega \rightarrow R_2 =$ kΩ, $12\,\Omega \rightarrow R_3 =$ kΩ.

   $i_{R_L}(R_L = 1\,\text{k}\Omega) =$ ____ 2 pts. 1
   $i_{R_L}(R_L = 4\,\text{k}\Omega) =$ ____ 2 pts. 2
   $i_{R_L}(R_L = 9\,\text{k}\Omega) =$ ____ 2 pts. 3

3. Find component values such that all three circuits shown behave identically.
   Parameter: $I_1 =$ mA, $V_1 =$ V, $R_1 =$ kΩ and $R_2 =$ kΩ.

   $V_T =$ ____ 1 pt. 4
   $R_T =$ ____ 1 pt. 5
   $I_N =$ ____ 1 pt. 6
   $R_N =$ ____ 1 pt. 7



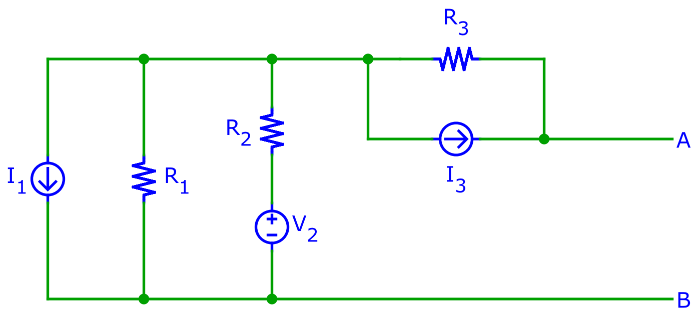
(a) **(b)** **(c)**

4. Find an equivalent representation for the I/V characteristics at terminals A and B of the circuit below consisting of only a current source I_x and resistor R_x.
   Draw the schematic of the equivalent circuit consisting of a current source I_x and resistor R_x. Label the components and terminals A and B.

Calculate the values of I_x and R_x for $I_1 =$ mA, $V_2 =$ V, $I_3 =$ mA, $R_1 =$ kΩ, $R_2 =$ kΩ, and $R_3 =$ kΩ.

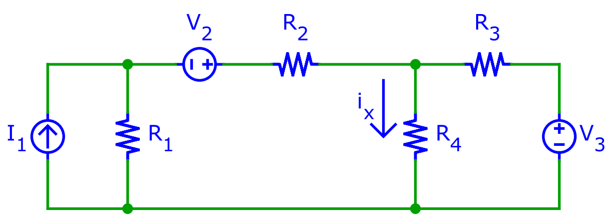
$I_x =$ [ ] 1 pt. 8

$R_x =$ [ ] 1 pt. 9



5. Calculate the value of current i_x. Parameter $I_1 =$ mA, $V_2 =$ V, $V_3 =$ V, $R_1 =$ kΩ, $R_2 =$ kΩ, $R_3 =$ kΩ and $R_4 =$ kΩ.

   $i_x =$ [ ] 12 pts. 10



6. For evaluation, circuit (a') is temporarily connected to circuit (a) and the following measurements are taken with the ampère- and volt-meters shown in circuit (a') (for different values of R_L):

   i) $V =$ V $A =$ mA
   ii) $V =$ V $A =$ mA

   a) Determine the values of V_T and R_T such that circuits (a) and (b) behave identically.

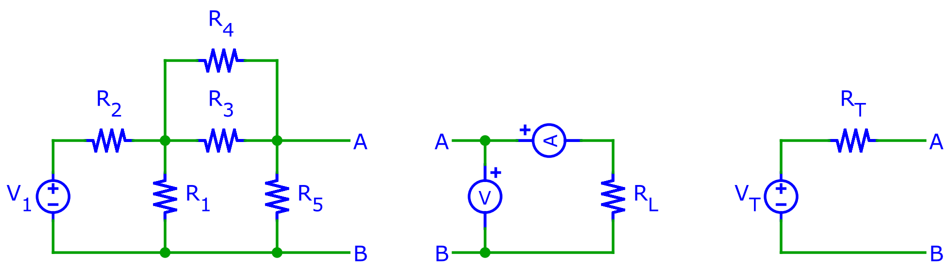
      $V_T =$ [ ] opt. 11

      $R_T =$ [ ] opt. 12

   b) The apprentice is asked to verify the measurement, but inadvertently mixes up the volt- and ampère-meters. What readings does he get when redoing measurement (i) above? Use the values from part (a) for V_T and R_T.

      $V =$ [ ] opt. 13

      $A =$ [ ] opt. 14



(a) (a') (b)

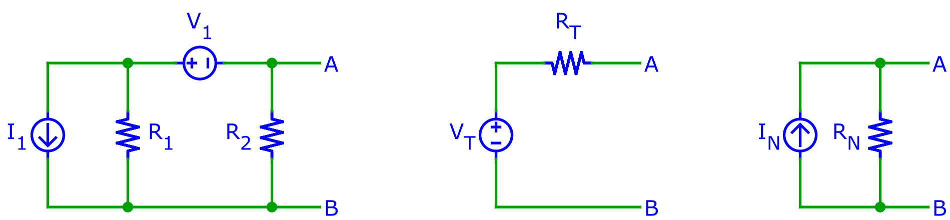
7. Find component values such that all three circuits shown behave identically. Given: $I_1 =$ mA, $V_1 =$ V, $R_1 =$ kΩ and $R_2 =$ kΩ.

$V_T =$ [ ] opt. 15

$R_T =$ [ ] opt. 16

$I_N =$ [ ] opt. 17

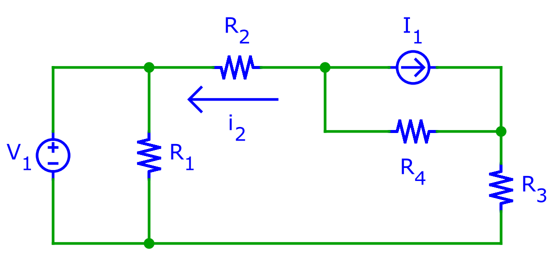
$R_N =$ [ ] opt. 18



(a) (b) (c)

8. Find the value of current i_2. Parameters: $V_1 =$ V, $I_1 =$ mA, $R_1 =$ kΩ, $R_2 =$ kΩ, $R_3 =$ kΩ, $R_4 =$ kΩ. Hint: Use source transformation.

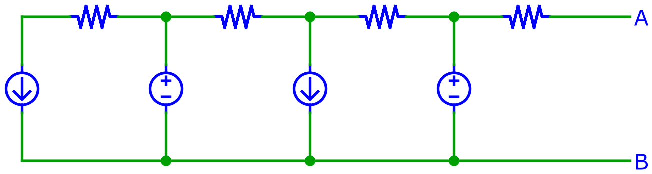
$i_2 =$ [ ] opt. 19



9. Find the Thevenin equivalent for port A-B in the circuit shown below. Use the following component values: resistors kΩ, voltage sources V, current sources mA.

$V_T =$ [ ] opt. 20

$R_T =$ [ ] opt. 21



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