(1) In the circuits below, find the equivalent resistance, $R_{ab}$, and the power delivered by the source. (Source: Nilsson and Reidel, 9th ed.)

Circuit 1:

Circuit 2:

Circuit 3:
(2) Chapter 3, Problem 2 from Nilsson and Reidel, 10th edition.
   (Same as Problem 8 from 9th edition of text.)
(3) Chapter 3, Problem 13 from Nilsson and Reidel, 10th edition.
   (Same as Problem 14 from 9th edition of text.)
   (Same as Problem 11 from 9th edition of text.)
(5) (a) Calculate the no-load voltage $v_0$ for the voltage divider circuit shown below.
    (b) Calculate the power dissipated by $R_1$ and $R_2$.
    (c) Now assume that only 1 W resistors are available. The source and the no-load voltages
        are the same as in (a). What must be the new minimum values of $R_1$ and $R_2$ to meet the
        new power specifications. Notice that $R_1 > R_2$ since the no-load voltage is smaller than
        that across $R_1$. Therefore, find $R_1$ first. (Why?)

![Voltage Divider Circuit]

(6) The voltage divider in the figure (a) below is loaded with the voltage divider shown in figure
    (b). That is, $a$ is connected to $a'$ and $b$ is connected to $b'$. Find $v_o$.
    (Source: Nilsson and Reidel, 9th ed.)

![Voltage Divider Circuits]

    (Same as Problem 20 from 9th edition of text.)
(8) Consider the following circuit.
(a) Use voltage division to find the voltage drop across the 18 Ω resistor, positive at the left.
(b) Using your result from (a), find the current flowing in the 18 Ω resistor from left to right.
(c) Starting with your result from (b), use current division to find the current in the 25 Ω resistor from top to bottom.
(d) Using your result from part (c), find the voltage across the 25 Ω resistor, positive at the top.
(e) Starting with your result from (d), use voltage division to find the voltage drop across the 10 Ω resistor, positive on the left.
(Source: Nilsson and Reidel, 9th ed.)

(9) Consider the following circuit.
(a) Use current division to find the current flowing from top to bottom in the 10 kΩ resistor.
(b) Using your result from (a), find the voltage across the 10 kΩ resistor, positive at the top.
(c) Starting with your result from (b), use voltage division to find the voltage drop across the 2 kΩ resistor, positive at the top.
(d) Using your result from (c), find the current through the 2 kΩ resistor from top to bottom.
(e) Starting with your result from (d), use current division to find the current through the 18 kΩ resistor from top to bottom.
(Source: Nilsson and Reidel, 9th ed.)
(10) Chapter 3, Problem 30 from Nilsson and Reidel, 10th edition.
(Same as Problem 25 from 9th edition of text.)

(11) (a) For the circuit shown below, find the value of $v_x$. Hint: use the voltage division rule twice to find the voltages across the 20 kΩ and 90 kΩ resistors.
(b) Suppose the 45 V source is replaced with a general source $v_s$ which is still positive at the upper terminal. Find $v_x$ as a function of $v_s$.

\[ v_s = 45 \text{ V} \]
\[ a \quad + \quad v_x \quad - \quad b \]
\[ 5 \text{ kΩ} \quad 60 \text{ kΩ} \]
\[ 20 \text{ kΩ} \quad 90 \text{ kΩ} \]

(12) Consider the following circuit.

(a) Suppose in the network that the voltage drop from terminal "a" to terminal "b" is 40 V. Use voltage division to find the drop across the 18 Ω resistor.
(b) Suppose in the network that the current through the 10 Ω resistor is 60 mA, flowing from left to right. Use current division to find the current through the 30 Ω resistor.

(13) For the circuit below, calculate (a) $i_g$ and (b) the power dissipated in the 30 Ω resistor.
(Source: Nilsson and Reidel, 9th ed.)
(Same as Problem 33 from 9th edition of text.)

(15) This is a question on the loading effect of a voltmeter – that is the voltmeter is not ideal and adds resistance to the circuit; consequently the meter itself affects the voltages it attempts to measure. Consider that a voltmeter has a sensitivity of 20-kΩ/V when set to a full-scale reading of 150 V (the sensitivity tells us how much resistance the voltmeter adds to the circuit for each volt of the scale reading – thus, this voltmeter adds 20 kΩ/V times 150 V or 3.0 MΩ to any circuit to which it is connected). (a) For the circuit shown below, find the actual voltage drop across the 200-kΩ resistor (i.e. without the voltmeter being in place). (b) What will the voltmeter read when it is connected as shown? (c) Suppose a cheap voltmeter with a sensitivity of 1-kΩ/V (full-scale reading of 150 V) was used instead. What would it read for the voltage across the 200-kΩ resistor?

![Circuit Diagram]

\[ \nu_s = 200 \text{ V} \]

\[ 200 \text{ kΩ} \]

\[ 100 \text{ kΩ} \]