Homework 2

Friday, September 18, 2020 9:44 PM

"I pledge my honor I have abided by the Stevens Honor system."

-Alex Gaskins

P1.65. Determine the value of I_x in the circuit shown in **Figure P1.65**.

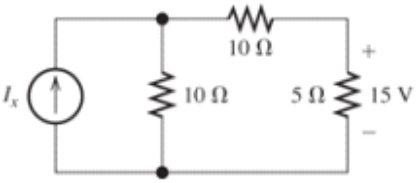


Figure P1.65

$V_1 = IR_1$

$15 = I(5)$

$I = 3\ A$

$V_2 = IR_2$

$V_2 = 3(10)$

$V_2 = 30\ V$

$V_3 = V_1 + V_2$

$V_3 = 45\ V$

$V_3 = IR_3$

$45 = I(10)$

$I = 4.5\ A$

$I_x = 3 + 4.5$

$\boxed{I_x = 7.5\ A}$

P1.67. The circuit shown in **Figure P1.67** is the electrical model for an electronic megaphone, in which the 8–Ω resistance models a loudspeaker, the source V x and the 5–kΩ resistance represent a microphone, and the remaining elements model an amplifier. Given that the power delivered to the 8–Ω resistance is 8 W, determine the current circulating in the right-hand loop of the circuit. Also, determine the value of the microphone voltage V x .

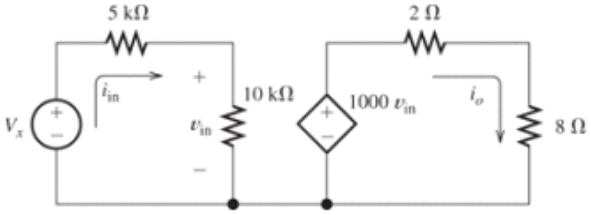


Figure P1.67

$P = VI$ $\quad I = \frac{P}{V}$

$V = \frac{P}{V}(8)$ $\quad V = 8\ V$

$V = IR$

$8 = I(8)$

$\boxed{I = 1\ A}$

$1000 V_{in} = 2i_o + 8i_o$

$1000 V_{in} = 10\ i_o$

$V_{in} = \frac{10\ (1)}{1000}$

$V_{in} = .01\ V$

$V = i_{in} R$

$.01 = i_{in} (10 \times 10^3)$

$i_{in} = .000001\ A$

$-V_x + 5000\ i_{in} + .01 = 0$

$\boxed{V_x = .015\ V}$

P1.68. Consider the circuit shown in **Figure P1.68**.

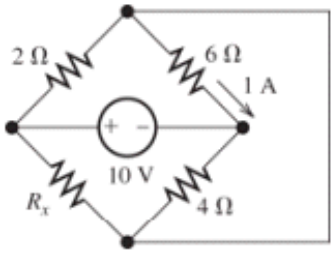
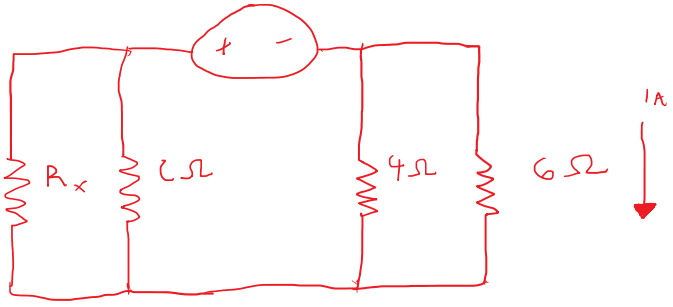


Figure P1.68



a. Which elements are in series?
b. Which elements are in parallel?
c. Apply Ohm's and Kirchhoff's laws to solve for R_x.

A.) None are in series

B.) 2Ω and R_x; 4Ω and 6Ω

c.) $V = IR$

$V = 1(6)$

$V = 6V$

$6 = I(4)$

$I = \frac{3}{2}$ A

$-R_x I + 10 - 6 = 0$

$R_x I = 4V$

$2 + I = \frac{5}{2}$

$I = \frac{1}{2}$ A

$V = IR$

$I = 2A$

$V = IR_x$

$4 = \frac{R_x}{2}$

$\boxed{R_x = 8\Omega}$

P1.71. Determine the value of v_x and i_y in the circuit shown in **Figure P1.71**.

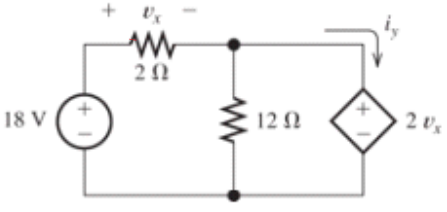


Figure P1.71

$-18 + V_x + 2V_x = 0$

$3V_x = 18$

$\boxed{V_x = 6V}$

$V = IR$

$6 = I(2)$

$I = 3A$

$-2V_x + 12i = 0$

$i = 1A$

$3 - 1 - i_y = 0$

$\boxed{i_y = 2A}$

$6 = I(2)$

$I = 3\ A$

***P1.75.** The circuit shown in **Figure P1.75** contains a voltage-controlled current source. Solve for v_s.

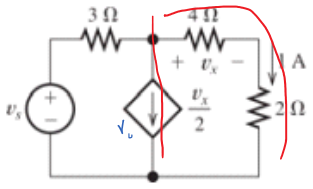


Figure P1.75

Parallel

$V_x = I_x R_x$

$V_x = 1(4)$

$V_x = 4\ V$

$i = \frac{V_x}{2}$

$i = 2\ A$

$i_s - i - i_x = 0$

$i_s = i + i_x$

$i_s = 2 + 1$

$i_s = 3\ A$

$V_c = (4+2)1$

$V_c = 6\ V$

$-V_s + 9 + 6 = 0$

$\boxed{V_s = 15\ V}$

P1.76. For the circuit shown in **Figure P1.76**, solve for i_s. What types of sources are present in this circuit?

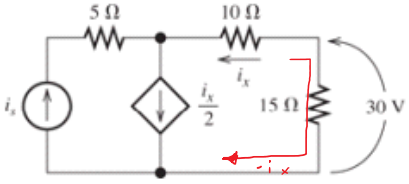


Figure P1.76

$V = i_x R$

$30 = i_x(15)$

$i_x = 2\ A$

Current source and voltage-controlled current source

$i_s + (-i_x) + \frac{i_x}{2} = 0$

$i_s - 1 = 0$

$\boxed{i_s = 1\ A}$