



جامعة الأهرام الكندية
AHRAM CANADIAN UNIVERSITY

Lecture (4)

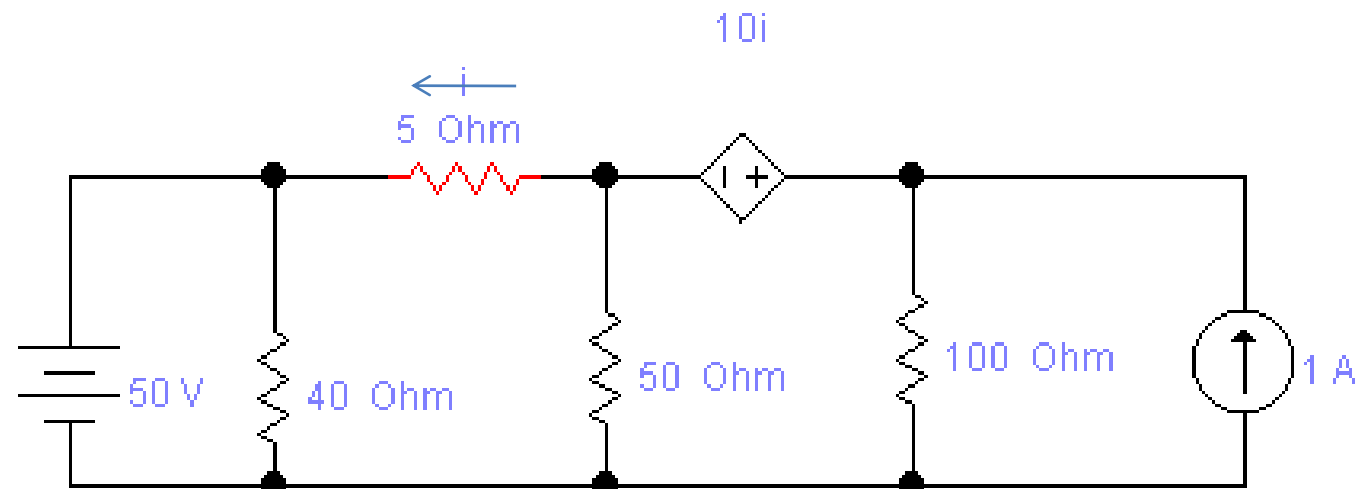
Circuit Analysis Techniques

Mesh Current

Dr. Ahmed M. ElShafee

Example 1

Find $V_{100\Omega}$



Example 1 solution

KVL @1

$$V_1 = 50V$$

Applying super node concept

KVL @2

$$(V_2 - V_1)/5 + V_2/50 + V_3/100 - 4 = 0$$

$$\rightarrow 1$$

From super node

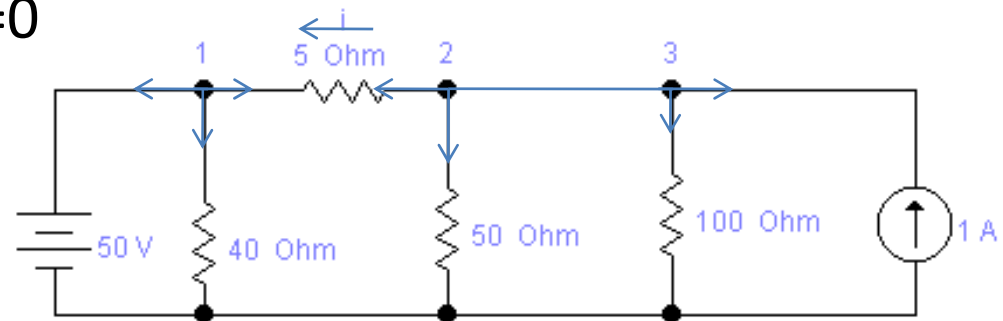
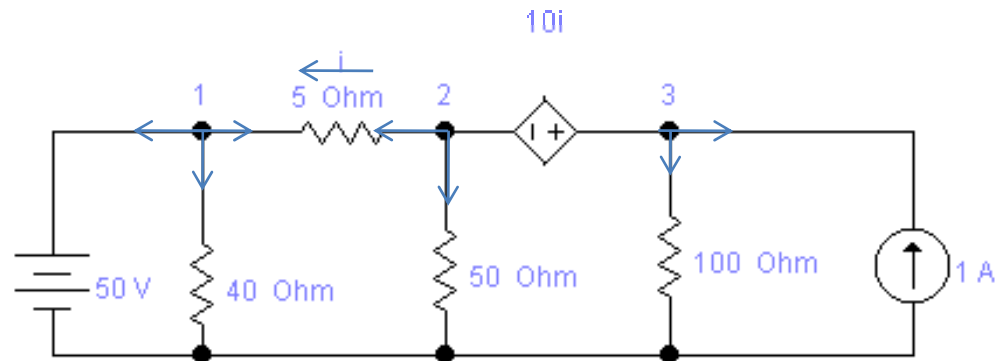
$$V_3 = V_1 + 10i \rightarrow 2$$

Ohm:

$$i = (V_2 - V_1)/5 \rightarrow 3 \quad \text{submit in 2}$$

$$V_3 = V_2 + 2V_2 - 100 =$$

$$3 \quad 3V_2 - 100 \rightarrow 4 \quad \text{submit in 1}$$



Example 1 solution (2)

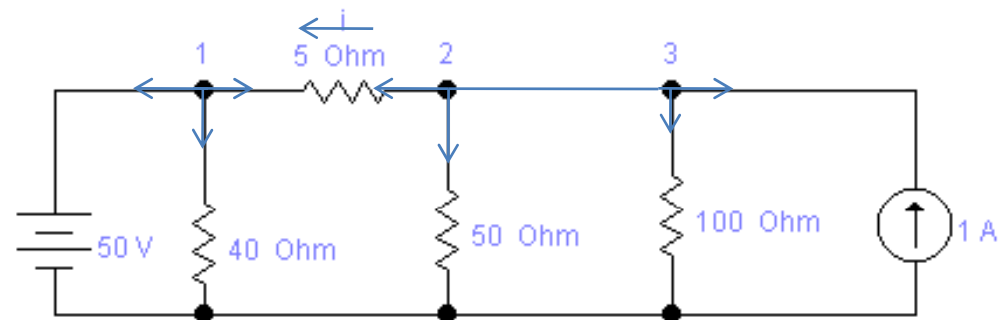
$$V_2/5 - 10 + V_2/50 + 3V_2/100 - 1 - 4 = 0$$

$$V_2(1/5 + 1/50 + 3/100) = 15$$

$$V_2 = 60V \rightarrow$$

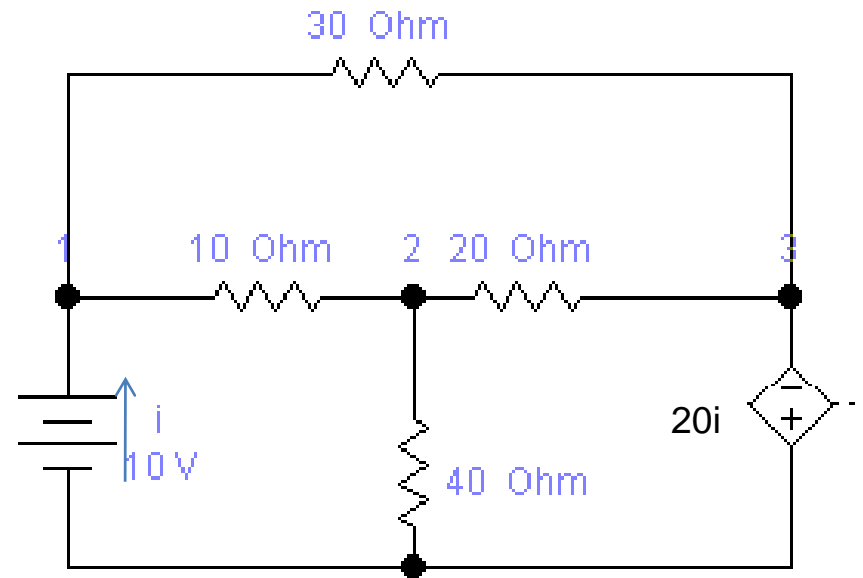
$$i = (60 - 50)/5 = 2A$$

$$V_3 = 60 + 20 = 80V = V_{100\Omega} \rightarrow$$



Example 2

- Find $V_{40\Omega}$



Example 2 solution

$$V_1 = 10V$$

$$V_3 = -20i$$

KCL @1

$$-i + (10 - V_2)/10 + (10 + 20i)/30 = 0$$

$$V_2(-1/10) + i((20/30) - 1) = -4/3 \times 30$$

$$3V_2 + 10i = 40$$

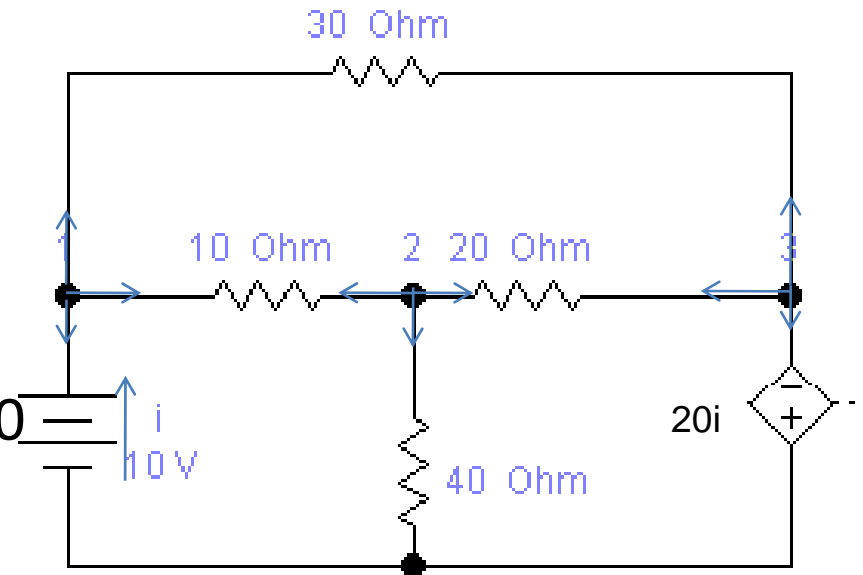
$$i = (40 - 3V_2)/10 \quad \rightarrow 1$$

KCL @2

$$(V_2 - V_1)/10 + (V_2 - V_3)/20 + V_2/40 = 0$$

$$V_2/10 - 1 + V_2/20 + 20i/20 + V_2/40 = 0$$

$$V_2(1/10 + 1/20 + 1/40) + i = 1$$



Example 2 solution (2)

$$7/40V_2+i=1$$

$$i=1 - 7/40V_2 \rightarrow 2$$

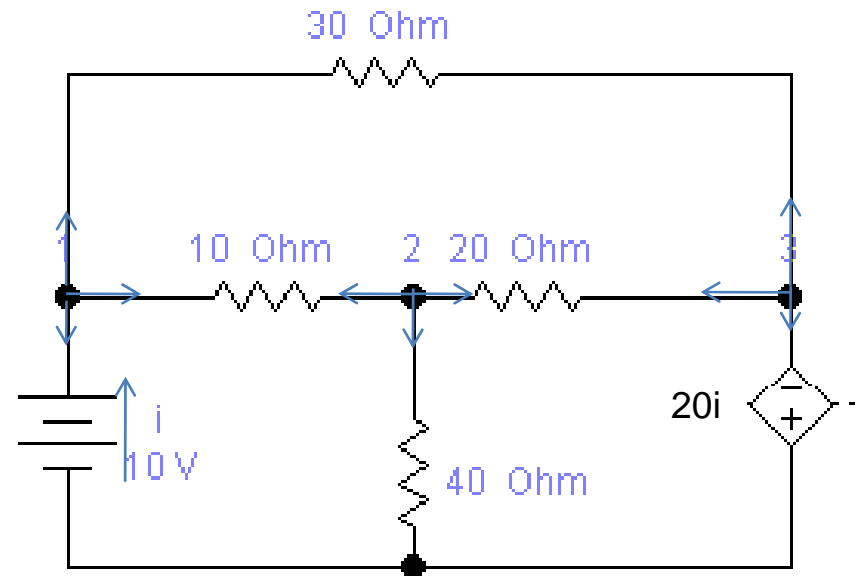
Submit 1 in 2

$$(40-3V_2)/10=1-(7/40)V_2 \quad \times 40$$

$$160-12V_2=40-7V_2$$

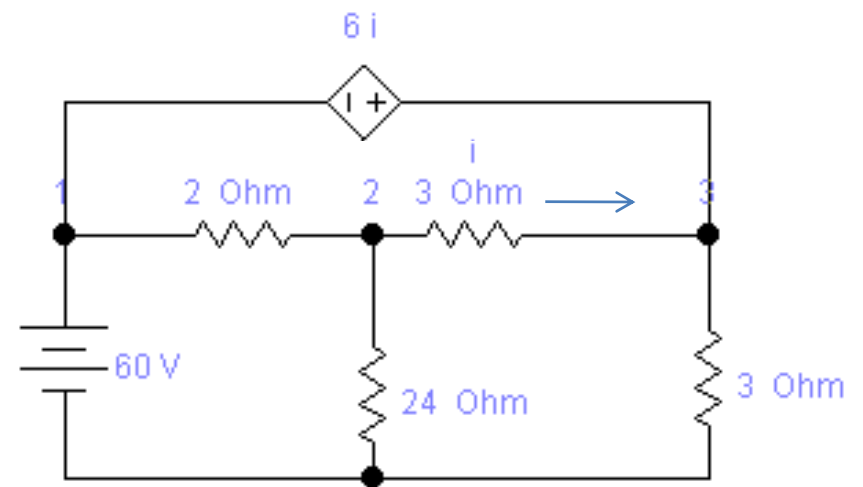
$$120 = 5V_2$$

$$V_2=24V$$



Example 3

Find $V_{24\Omega}$



Example 3 solution

$$V_1 = 60V$$

$$V_3 = 60 + 6i$$

Ohm:

$$i = (V_3 - V_2) / 3 = (60 + 6i - V_2) / 3$$

$$3i = 60 + 6i - V_2$$

$$3i - V_2 = -60 \rightarrow 1$$

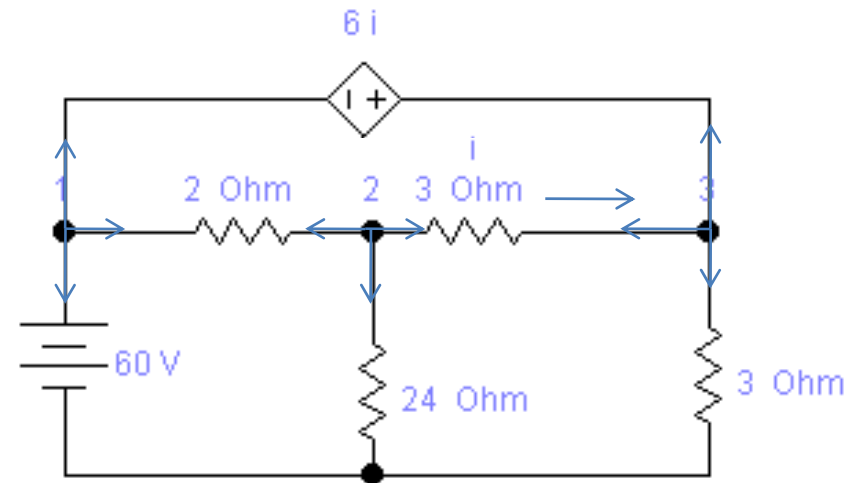
KCL @ 2

$$(V_2 - 60) / 2 + V_2 / 24 - i = 0$$

$$V_2(1/2 + 1/24) - i = 30$$

$$(13/24)V_2 - i = 30 \quad \times 24$$

$$13V_2 - 24i = 720 \quad \rightarrow 2$$



Example 3 solution (2)

multiply 1 by 8

$$24i - 8V_2 = -480 \quad \rightarrow 3 \quad \text{add 2,3}$$

$$5V_2 = 240$$

$$V_2 = 48V$$

Thanks, see you next week isA,...