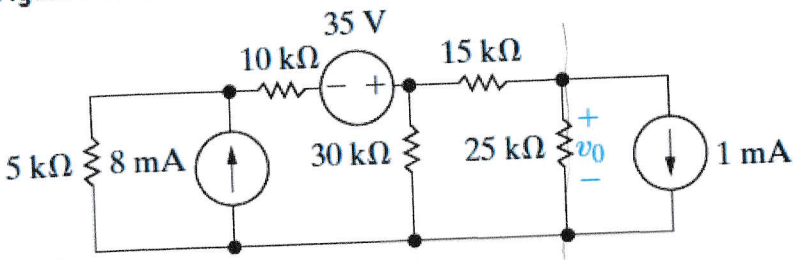
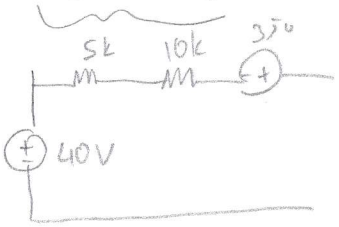
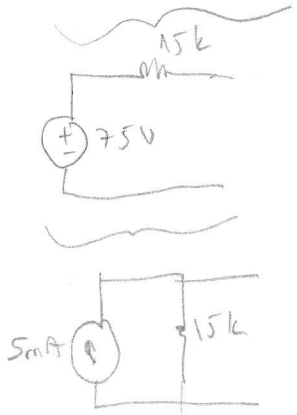
4.59 a) Make a series of source transformations to find the voltage v_0 in the circuit in Fig. P4.59.

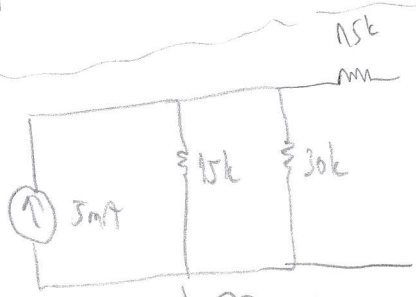
b) Verify your solution using the mesh-current method.

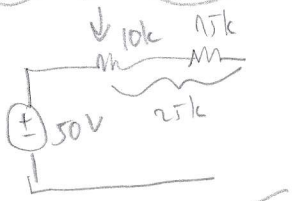
Figure P4.59

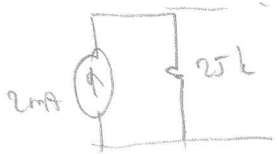


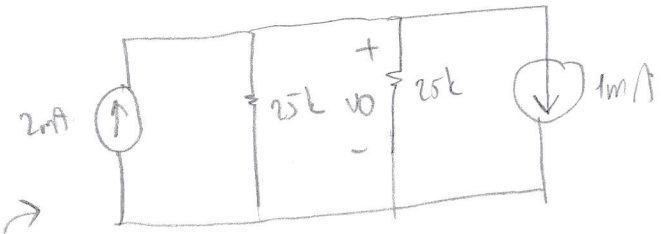


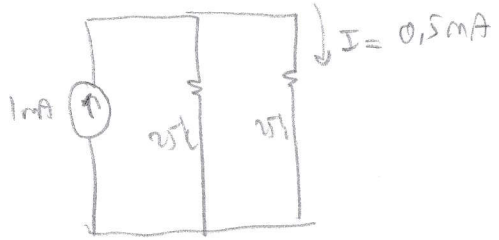












$V_o = 25k \cdot 0{,}5mA$

$= 12{,}5\,V$

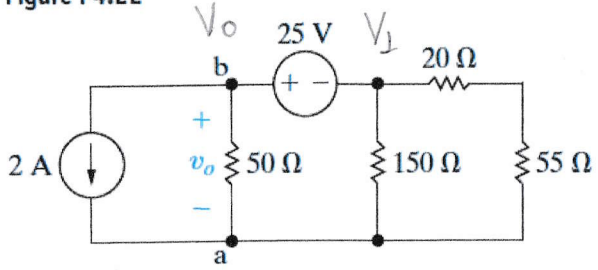
4.22 PSPICE MULTISIM

a) Use the node-voltage method to find v_o and the power delivered by the 2 A current source in the circuit in Fig. P4.22. Use node a as the reference node.

b) Repeat part (a), but use node b as the reference node.

c) Compare the choice of reference node in (a) and (b). Which is better, and why?

Figure P4.22



$-V_o + 25 + V_1 = 0$

$V_o = V_1 + 25$

$V_1 = V_o - 25$

Supernode

$$2 + \frac{V_o}{50} + \frac{V_1}{150} + \frac{V_1}{75} = 0$$

$3V_o + V_1 + 4V_1 = -300$

$3V_o + 5V_1 = -300$

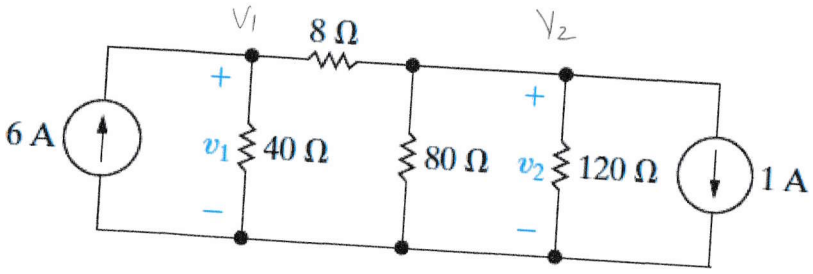
$3V_o + 5V_o - 125 = -300$

$8V_o = -175$

$V_o = -21.875\ V$

4.13 PSPICE MULTISIM Use the node-voltage method to find v_1 and v_2 in the circuit shown in Fig. P4.13.

Figure P4.13



$$-6 + \frac{V_1}{40} + \frac{V_1 - V_2}{8} = 0$$

$$1 + \frac{V_2}{120} + \frac{V_2}{80} + \frac{V_2 - V_1}{8} = 0$$

$$V_1 + 5V_1 - 5V_2 = 240$$

$$6V_1 - 5V_2 = 240$$

$$2V_2 + 3V_2 + 30V_2 - 30V_1 = -240$$

$$-30V_1 + 35V_2 = -240$$

$$6V_1 - 5V_2 = 30V_1 - 35V_2$$

$$30V_2 = 24V_1$$

$$5V_2 = 4V_1$$

$$6V_1 - 4V_1 = 240$$

$$2V_1 = 240$$

$$V_1 = 120$$

$$5V_2 = 4 \cdot 120$$

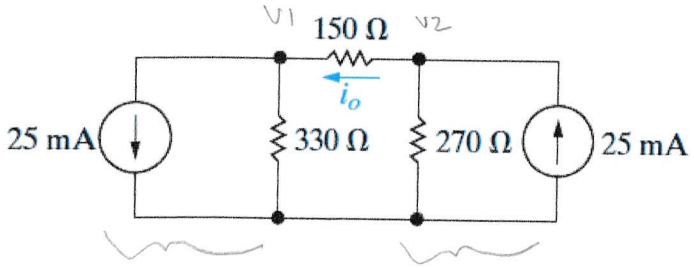
$$V_2 = 96\,V$$

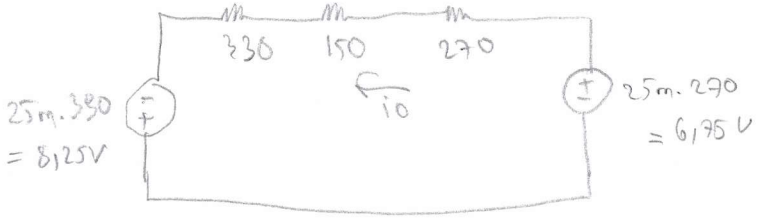
4.61 PSPICE MULTISIM

a) Use source transformations to find the current i_o in the circuit in Fig. P4.61.

b) Verify your solution by using the node-voltage method to find i_o.

Figure P4.61





$$i_o = \frac{6,75 + 8,25}{750} = 0,02A$$

$$i_o = +2\,mA$$

$$25m + \frac{V_1}{330} + \frac{V_1 - V_2}{150} = 0$$

$$150V_1 + 330V_1 - 330V_2 = -1237,5$$

$$480V_1 - 330V_2 = -1237,5$$

$$-25m + \frac{V_2}{270} + \frac{V_2 - V_1}{150} = 0$$

$$150V_2 + 270V_2 - 270V_1 = 1012,5$$

$$-270V_1 + 420V_2 = 1012,5$$

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$$480V_1 - 330V_2 = -1237,5$$

$$-270V_1 + 420V_2 = 1012,5$$

$$20160V_1 - 13860V_2 = -51975$$

$$-8910V_1 + 13860V_2 = 33412,5$$

$$11250V_1 = -18562,5$$

$$V_1 = -1,65$$

$$480.(-1,65) - 330V_2 = -1237,5$$

$$-330V_2 = -445,5$$

$$V_2 = +1,35$$

$$i_o = \frac{V_2 - V_1}{150} = \frac{1,35 - (-1,65)}{150} = \frac{3}{150} = 0,02\,A$$

$$= 2\,mA$$