EEN 201
CIRCUIT
ANALYSIS I

SPRING 2007
TEST 2
50 MINUTES

100/100

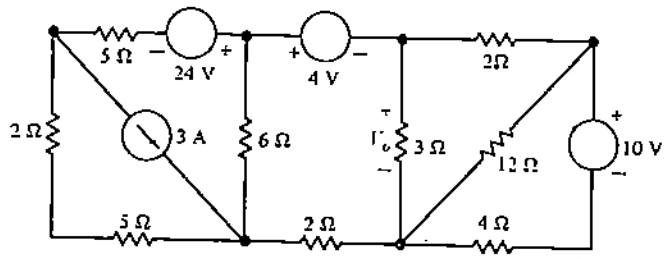
NDU
ECCE DEPARTMENT
S. C. ELMURR

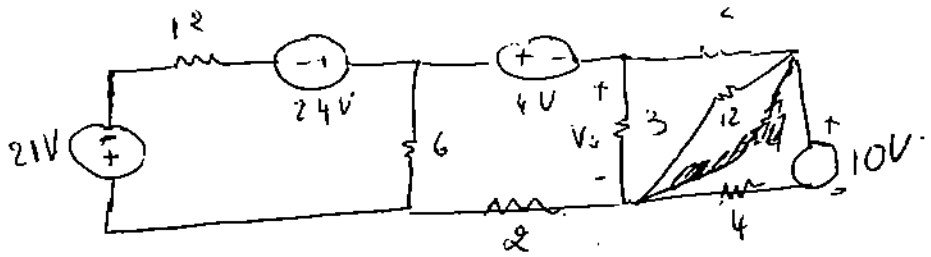
NAME: Amanda Abi Nader

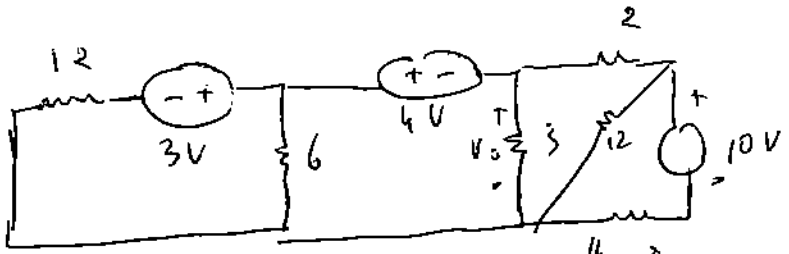
NOTE1: OPEN BOOK, OPEN NOTES, CLOSED OLD TESTS AND SOLUTIONS.
NOTE2: SHOW ALL WORK IN ORDER TO RECEIVE FULL CREDIT.

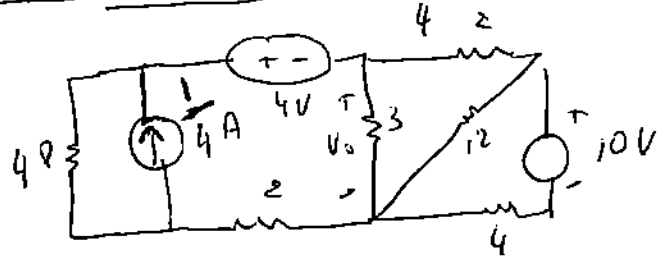
1. 25 Pts. Use source transformation to find V_o in the network in Fig. P5.20.

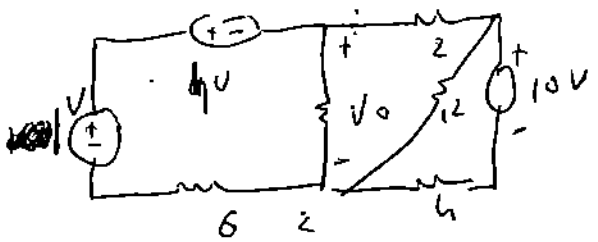
25
1) 25
2) 25
3) 25
4)

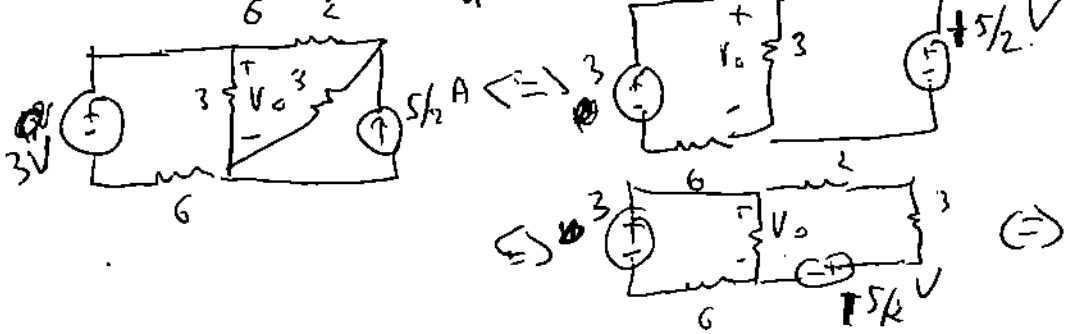




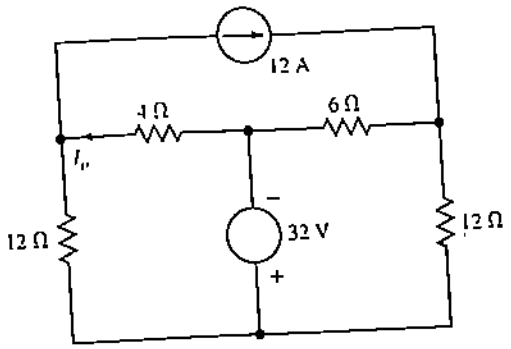




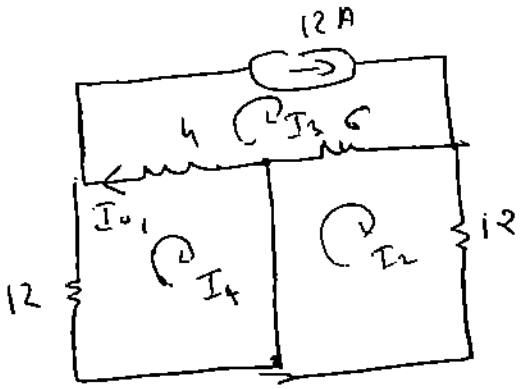




2. 25 Pts. Use superposition to find I_o in the network in Fig. P5.9.



I_{o1} due to the 12 A source ..



$I_3 = 12\,A$

$4(I_1 - I_3) + 12I_1 = 0$

$4I_1 - 4I_3 + 12I_1 = 0$

$16I_1 = 4I_3$

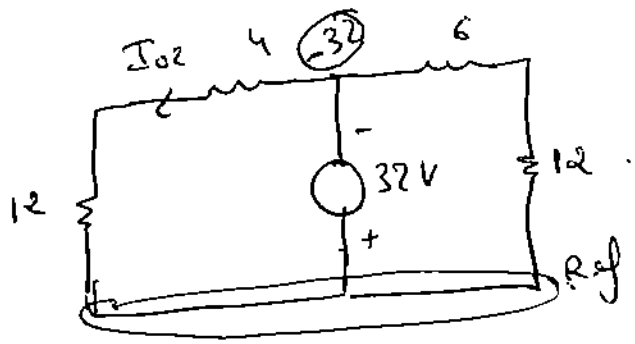
$16I_1 = 4 \times 12$

$\boxed{I_1 = 3\,A}$

$I_{o1} = I_3 - I_1$

$= 12 - 3 = 9\,A$ ✓

I_{o2} due to the 32 V source



$I_{o2} = -\frac{32}{16} = -2\,A$ ✓

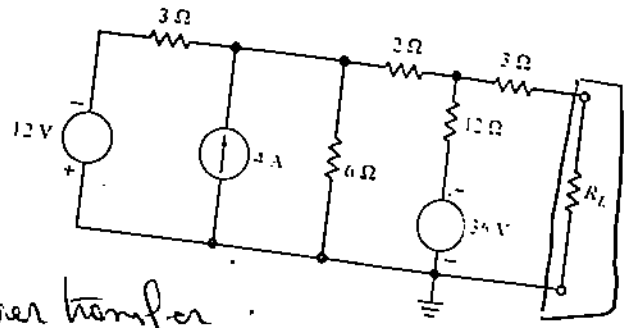
$\Rightarrow I_o = I_{o1} + I_{o2}$

$= 9 - 2$

$= 7\,A$

$\boxed{I_o = 7\,A}$ ✓

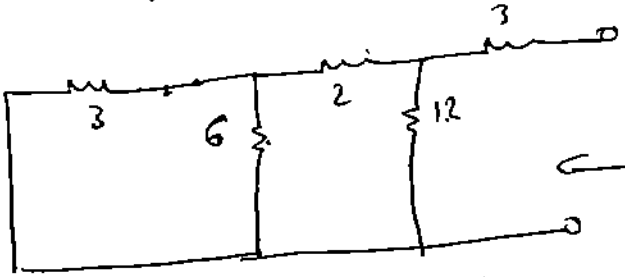
3. 25 Pts. 5.58. Determine the value of R_L in Fig. P5.58 for maximum power transfer.



Network B.

for maximum power transfer.

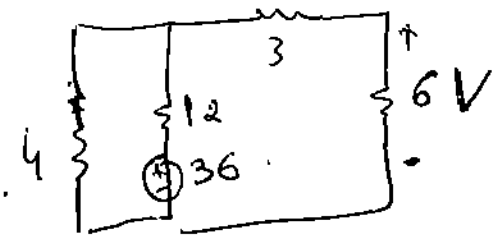
$R_L = R_{TH}$



R_{TH}

$R_{TH} = .6\,\Omega$

$R_{TH} = R_L = 6\,\Omega$ ✓



$R_{eq} = \frac{36}{13} + 12 = \frac{192}{13}\,\Omega$

$I = \frac{(36)(13)}{192}\,A$

$V = \frac{(36)(13)}{192} * \frac{4}{13} = \frac{3}{4} \times 6 = 4.5\,V$

$P = \frac{V^2}{R} = \frac{(4.5)^2}{6} = \frac{20.25}{6}\,W$

$P_{max} = 3.375\,W$ ✓

a

4. 25 Pts. 5.39. Use Thévenin's theorem to compute the current in R_L in Fig. P5.39.

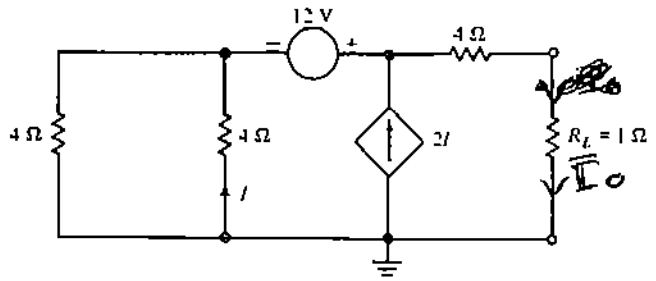
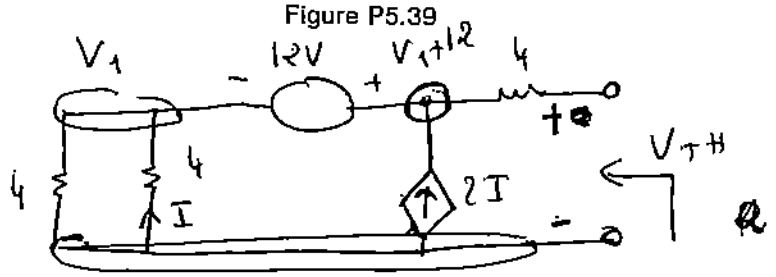


Figure P5.39



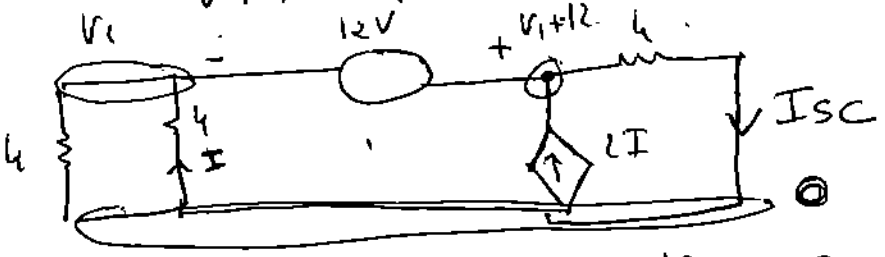
$$I = -\frac{V_1}{4}$$

$$\frac{V_1}{4} + \frac{V_1}{4} - 2I = 0$$

$$V_1 + V_1 - 8I = 0$$

$$V_1 + V_1 + 2V_1 = 0 \Rightarrow V_1 = 0$$

$$V_{TH} = V_1 + 12 = 12\,V$$



$$\frac{V_1}{4} + \frac{V_1}{4} - 2I + \frac{V_1+12}{4} = 0$$

$$\frac{V_1}{4} + \frac{V_1}{4} - 8I + V_1 + 12 = 0$$

$$3V_1 - 8I = -12$$

$$3V_1 + 2V_1 = -12$$

$$5V_1 = -12$$

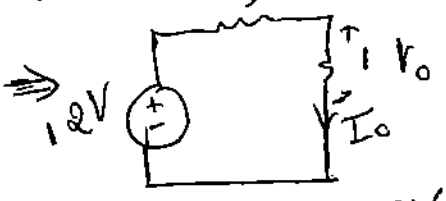
$$V_1 = -\frac{12}{5}\,V$$

$$I_{SC} = \frac{V_1+12}{4}$$

$$I_{SC} = \frac{-\frac{12}{5}+12}{4}$$

$$= \frac{48}{20} = \frac{12}{5}$$

$R_{TH} = 5\,\Omega$



$$V_o = \frac{12}{6} = 2V$$

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

$$R_{TH} = \frac{12}{12/5} = 5\,\Omega$$