

Q4. Problem 3.53

Find the Norton equivalent of the circuit to the left of the $2\text{-}\Omega$ resistor in the Figure P3.53.

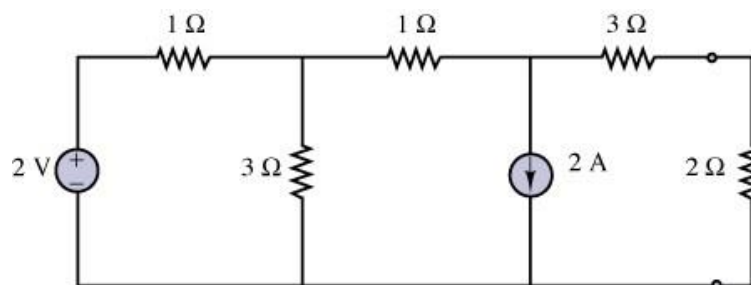
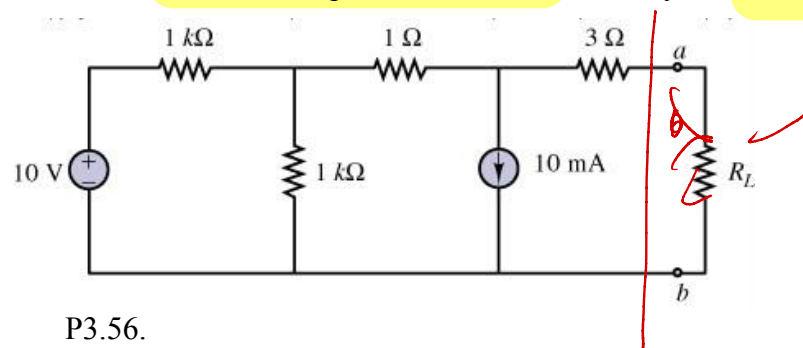


Figure P3.53

Q5. Problem 3.55

Find the Thevenin equivalent resistance seen by the load resistor R_L in the circuit of Figure



P3.56.

Figure P3.56

Q6. Problem 3.66

Find the Thevenin resistance as seen by the 10Ω resistor. Compute the Thevenin voltage and Norton current when the 10Ω resistor is the load.

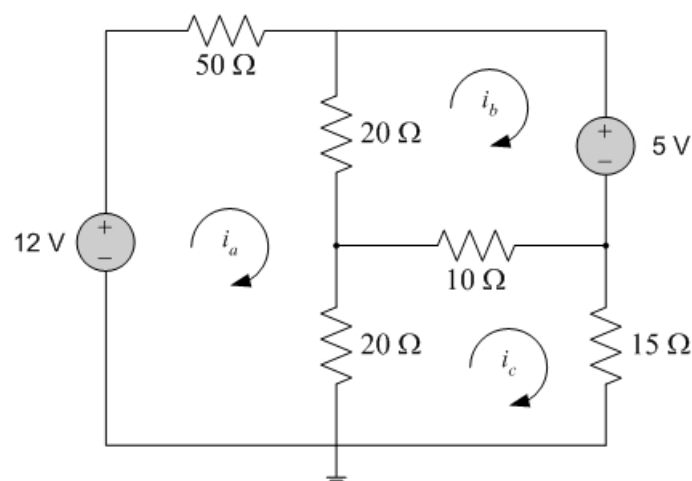
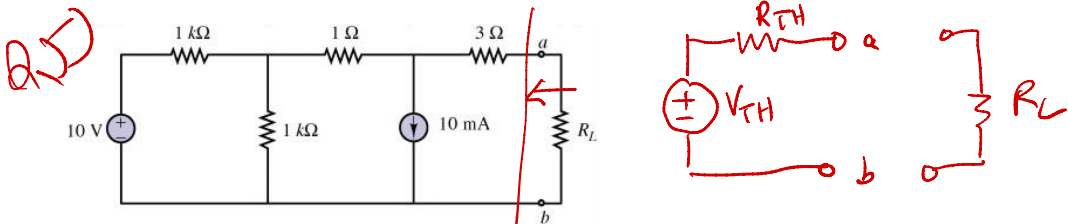
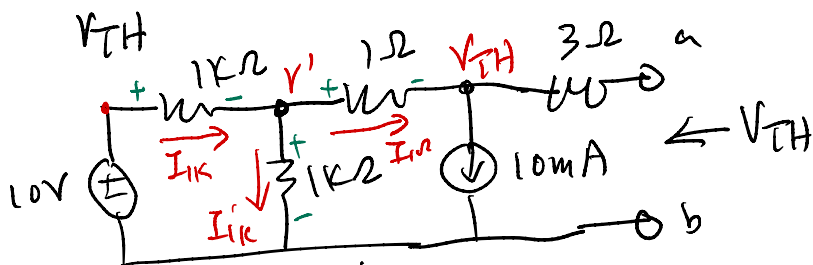
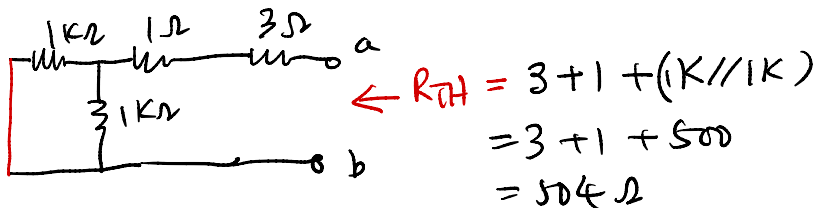


Figure P3.66



$R_{TH} : \text{S.C} \rightarrow 10V$
 $\text{O.C} \rightarrow 10mA$



Apply KCL at node v'

$$I_{1K} - I'_{1K} - I_{1\Omega} = 0$$

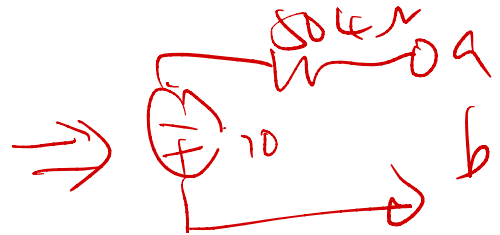
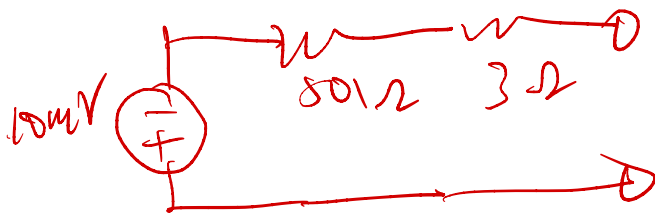
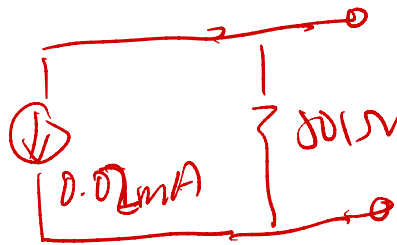
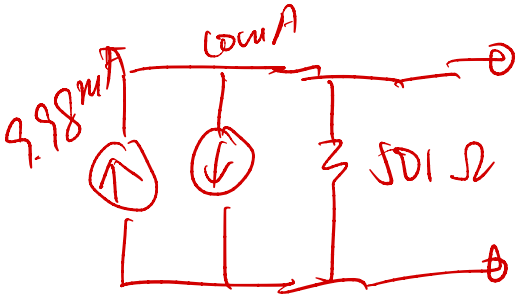
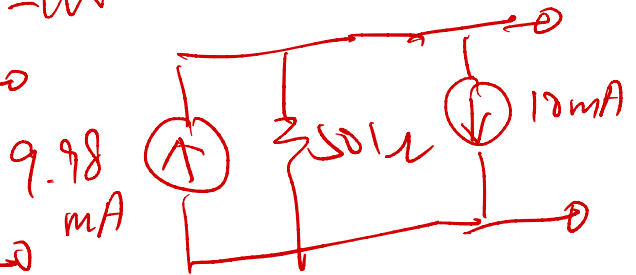
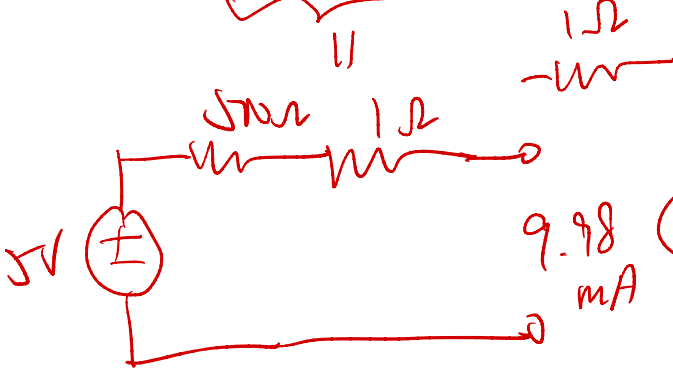
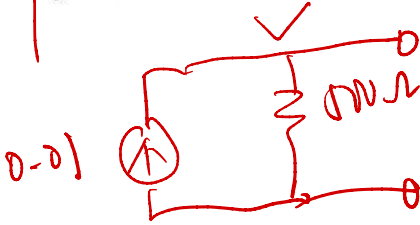
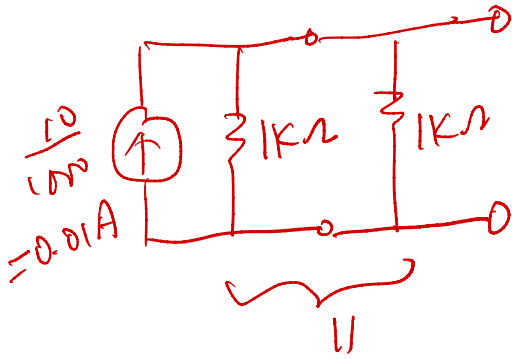
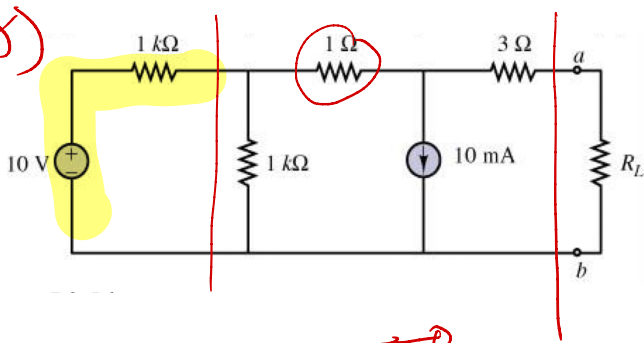
$$\frac{10 - v'}{1K} - \frac{v'}{1K} - \frac{v' - V_{TH}}{1\Omega} = 0 \quad \text{--- (1)}$$

$$I_{1\Omega} = \frac{v' - V_{TH}}{1} = 10mA \quad \text{--- (2)}$$

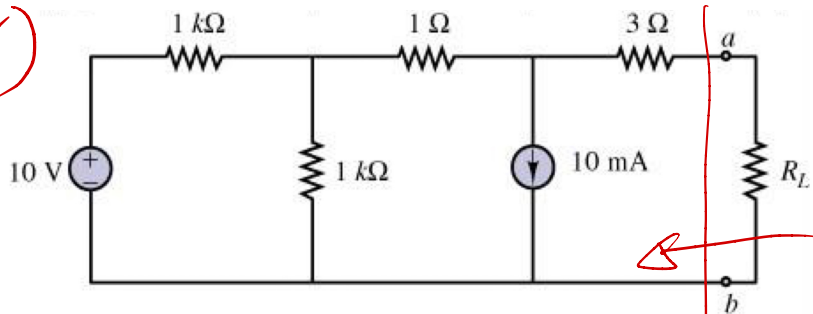
$$I_{1\Omega} - 10mA = 0$$

$$\frac{v' - V_{TH}}{1} - 10mA = 0$$

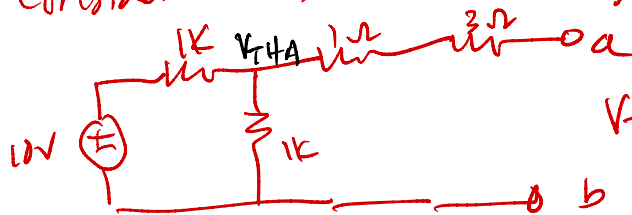
Q3)



Q5)

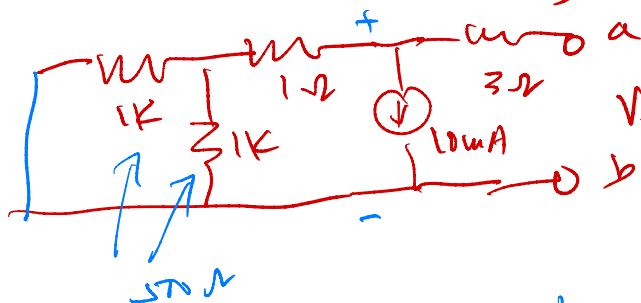


Consider 10V, remove 10mA by O.C



$$V_{THA} = 10 \frac{1K}{1K + 1K} = 5V$$

Consider 10mA, remove 10V by S.C



$$V_{THB} = (10mA)(1 + 500\Omega) = 5.01V$$

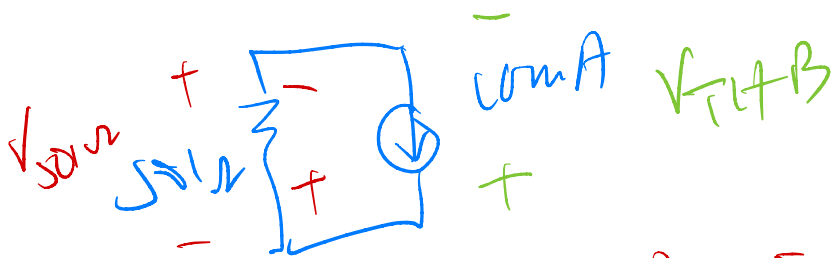
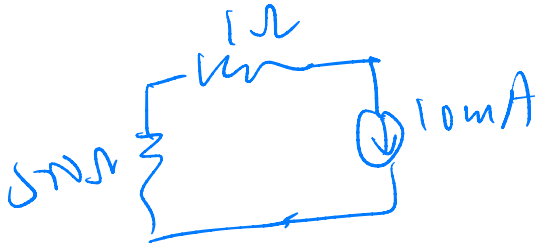
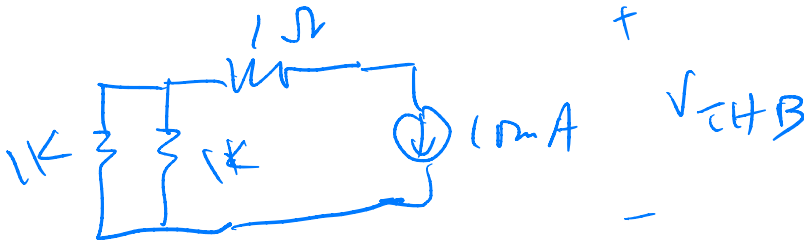
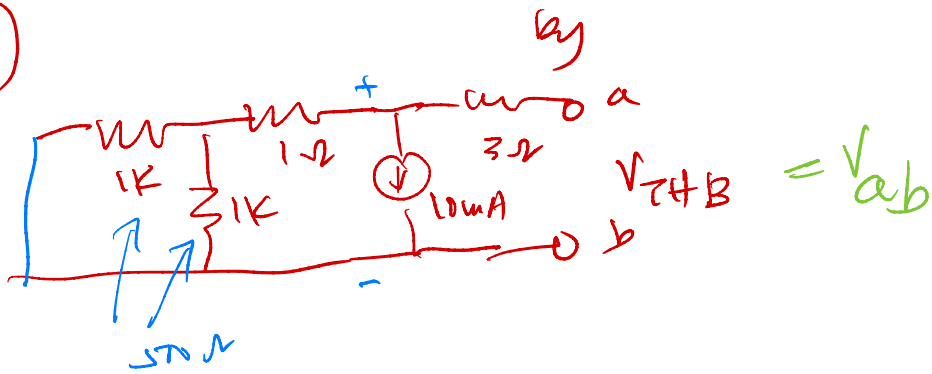
In combining the effect of both sources 10V, 10mA

$$V_{TH} = V_{THA} + V_{THB} = 5 - 5.01V$$

$$= -0.01V$$

$$= -10mV$$

Q5)



$$V_{50\Omega} = (50)(10mA) = 5.0V$$

$$V_{THB} = -V_{50\Omega} = -5.0V$$

Q7. Problem 3.62

Find the Thevenin equivalent resistance seen by resistor R_3 in circuit of Figure P3.5. Hence then compute the Thevenin (open-circuit) voltage and Norton (short-circuit) current when R_3 is the load. Assume all resistors in the circuit are 100Ω and voltage sources are $5V$.

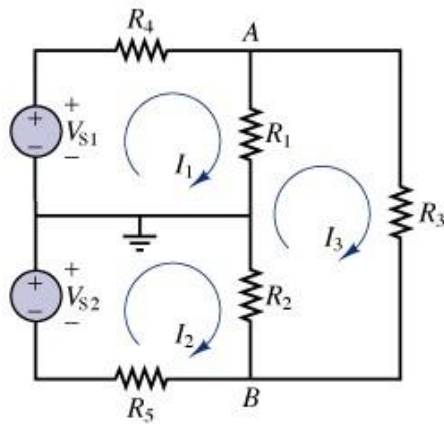


Figure P3.5

Handwritten calculations for the open-circuit voltage V_{ab} :

$$V_{ab} = 10V$$

$$V_{ab} = V_{ag} - V_{bg}$$

$$= 20V - 10V = 10V$$

$$= 10V - 5V = 5V$$

27)

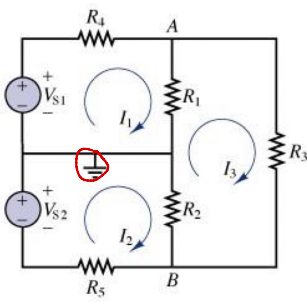
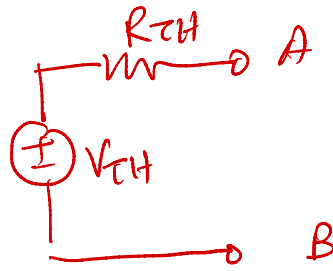
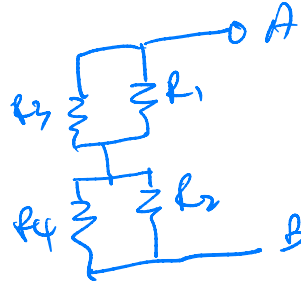
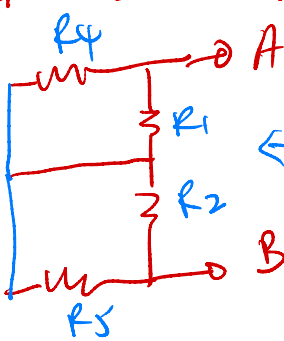


Figure P3.5



To determine the R_{TH} : $V_{S1} = V_{S2} \rightarrow$ s.c.



$$\begin{aligned}
 R_{TH} &= R_1 \parallel R_3 \\
 &\quad + R_2 \parallel R_4 \\
 &= 50 \tau 50 \\
 &= 100 \Omega
 \end{aligned}$$

27)

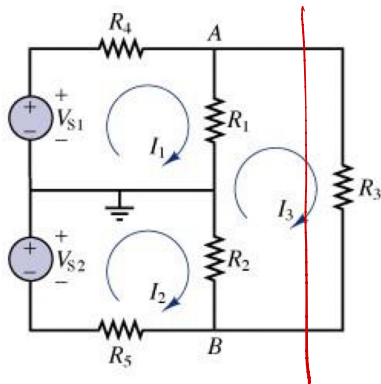
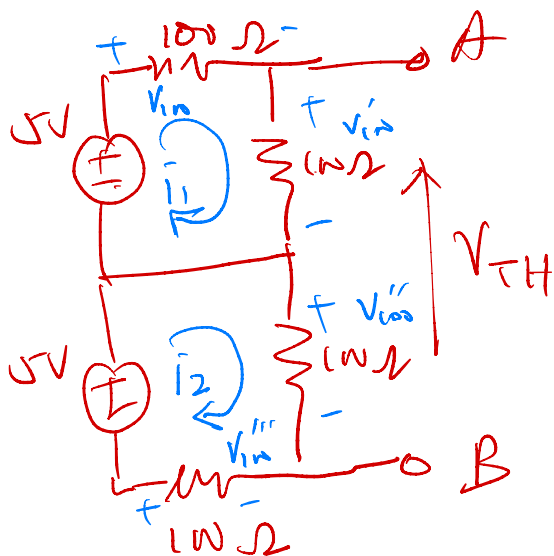


Figure P3.5



By KVL

$$\text{loop } i_1 \quad 5 = V_{100}' + V_{100}$$

$$5 = 100i_1 + 100i_1$$

$$5 = 200i_1 \Rightarrow i_1 = \frac{5}{200} \Rightarrow V_{100}' = 2.5V$$

loop i_2 KVL

$$5 = V_{100}'' - V_{100}'$$

$$5 = 100i_2 - (-100i_2) \Rightarrow i_2 = \frac{5}{200} \Rightarrow V_{100}'' = 2.5V$$

$$V_{TH} = V_{100}' + V_{100}'' = 2.5 + 2.5 = 5V$$

$$\uparrow \quad \uparrow$$

$$i_1(100) \quad i_2(100) =$$

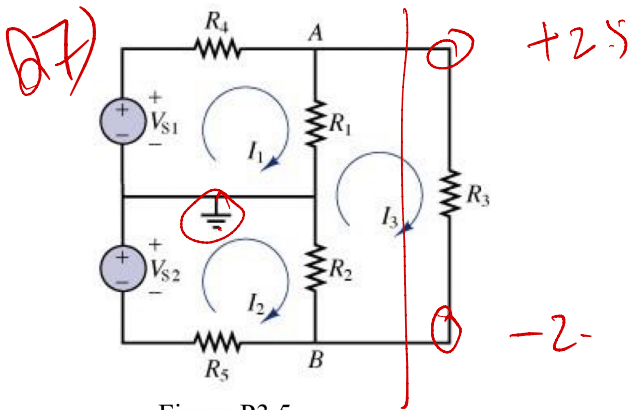


Figure P3.5

