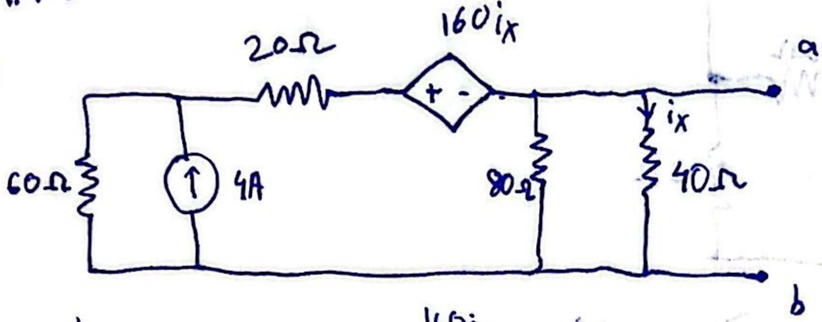
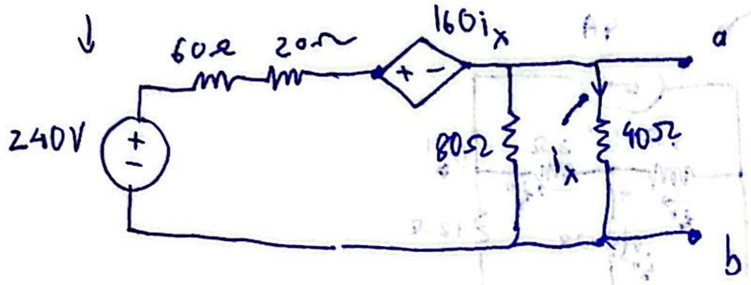
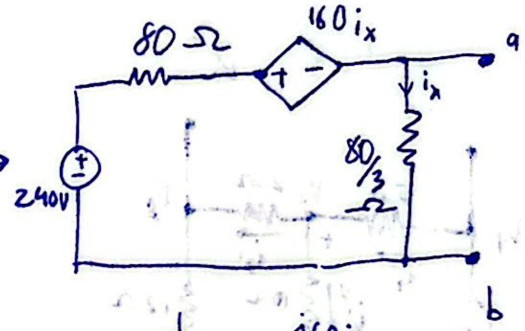
Đỗ Minh Duy ITITSB22029.

HW3.

1



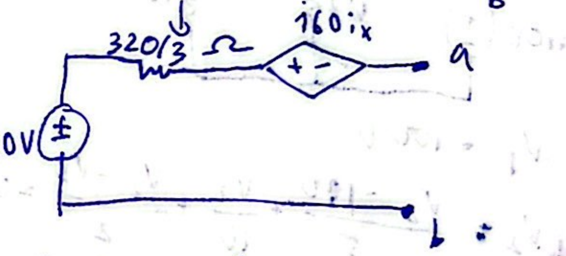




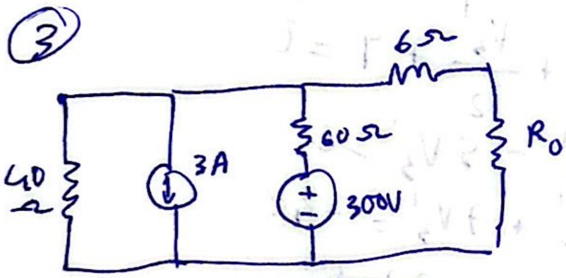
$\Rightarrow V_{Th} = V_{ab} = 240V$

$\Rightarrow R_{Th} = 320/3\ \Omega$

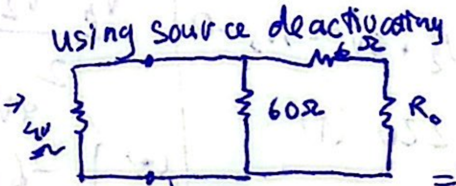
$\Rightarrow I_{sc} = \frac{240}{320/3} = 2.25A$



3



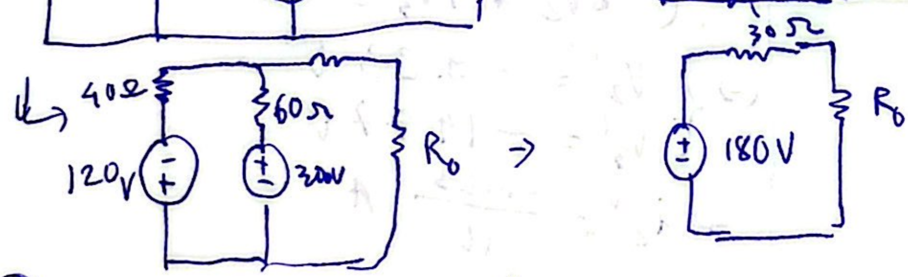
using source deactivating



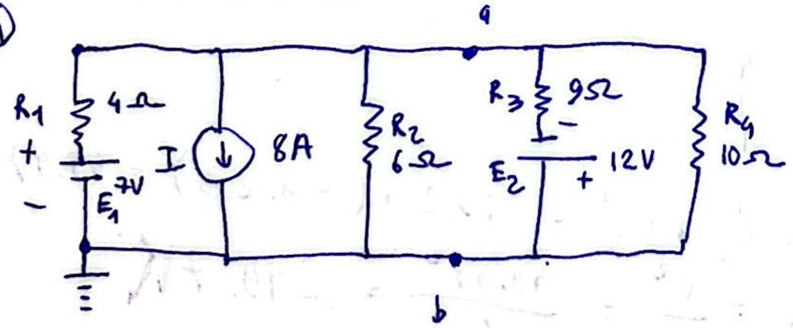
$\Rightarrow (40 // 60) + 6$

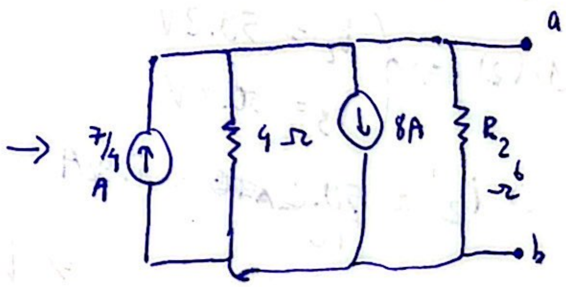
$\Rightarrow R_{Th} = R_0 = 30\Omega$

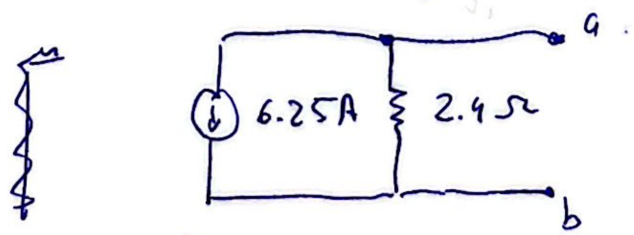
$\Rightarrow P_{max} = \frac{V_{Th}^2}{4R_0} = \frac{180^2}{4 \times 30} = 270W$



4

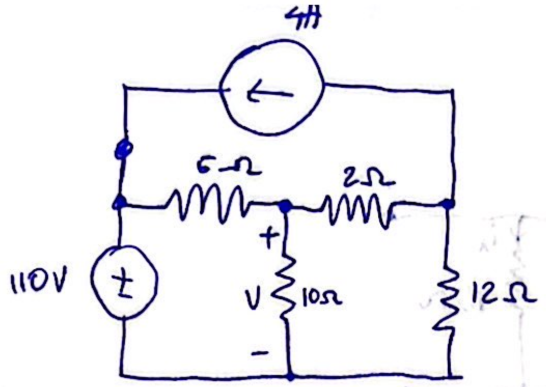




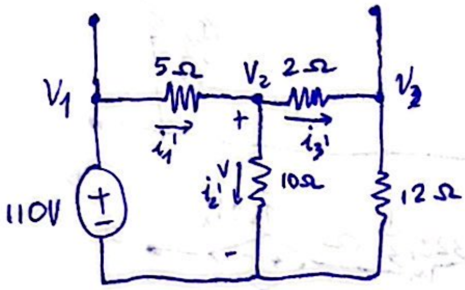


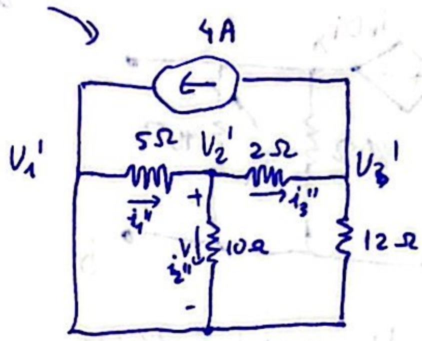
Norton Equivalent circuit left a-b

2



Find v and $P_{10\Omega}$





$V_1 = 100\ V$

node V_2: $\dfrac{V_2 - 110}{5} + \dfrac{V_2}{10} + \dfrac{V_2 - V_3}{2} = 0$

$\Leftrightarrow 2V_2 - 220 + V_2 + 5V_2 - 5V_3 = 0$

$\Leftrightarrow 8V_2 - 5V_3 = 220 \quad (1)$

node V_3: $\dfrac{V_3 - V_2}{2} + \dfrac{V_3}{12} = 0$

$\Leftrightarrow 6V_3 - 6V_2 + V_3 = 0$

$\Leftrightarrow -6V_2 + 7V_3 = 0 \quad (2)$

$(1)(2) \Rightarrow \begin{cases} V_2 = 59.2V \\ V_3 = 50.8V \end{cases}$

$\Rightarrow i_2' = \dfrac{59.2}{10} = 5.92A$

$\dfrac{V_2'}{5} + \dfrac{V_2'}{10} + \dfrac{V_2' - V_3'}{2} = 0$

$\dfrac{V_3' - V_2'}{2} + \dfrac{V_3'}{12} + 4 = 0$

$\Leftrightarrow \begin{cases} 8V_2' - 5V_3' = 0 \\ -6V_2' + 7V_3' = -48 \end{cases}$

$\Leftrightarrow \begin{cases} V_2' = -9.23\ V \\ V_3' = -14.77\ V \end{cases}$

$\Rightarrow i_2'' = \dfrac{-9.23}{10}\ A$

$\Rightarrow V = V_2 + V_2' = 59.2 + (-9.23) = 49.97\ V$

$\Rightarrow P_{10\Omega} = \dfrac{V^2}{R_{10\Omega}} = \dfrac{49.97^2}{10} = 249.7W$