Name: ______________________________ (please print)

Signature: ___________________________

ECE 2202 – Quiz 1
January 27, 2022

1. This quiz is closed book, closed notes. You may have one 8.5 x 11" crib sheet.
2. Show all work necessary to complete the problem. A solution without the appropriate work shown will receive no credit. A solution which is not given in a reasonable order will lose credit.
3. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
4. If the grader has difficulty following your work because it is messy or disorganized, you will lose credit.
5. Do not use red ink. Do not use red pencil.
6. You will have 30 minutes to work on this quiz. If you are taking it online, you will have an additional 10 minutes to download/print, scan and submit to Blackboard

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Room for extra work

a) Find the **Thevenin** equivalent of the circuit shown in Figure 1 at terminals α, β. Draw the Thevenin equivalent with the terminals carefully labeled.

b) Find the **Norton** equivalent of the circuit shown in Figure 2 at terminals ϕ, δ. Draw the Norton equivalent with the terminals carefully labeled.

c) In Figure 3, the two circuits shown in Figures 1 and 2 have been connected. Find the **Thevenin** equivalent of the new circuit at terminals a, b. Draw the Thevenin equivalent with the terminals carefully labeled.

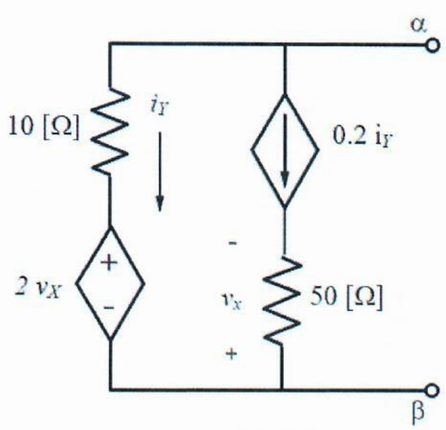


Figure 1

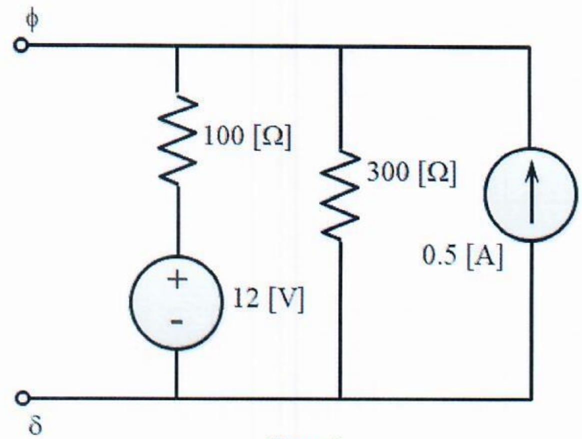


Figure 2

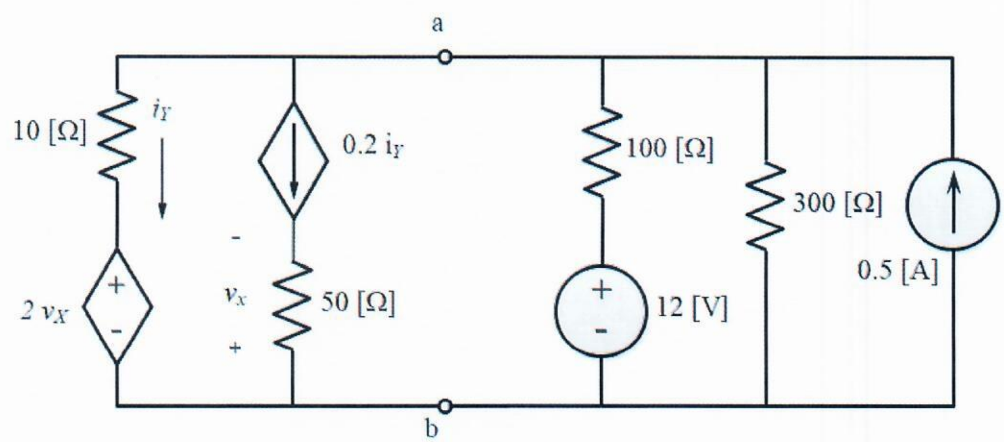


Figure 3

Room for extra work

a) Find the **Thevenin** equivalent of the circuit shown in Figure 1 at terminals α, β. Draw the Thevenin equivalent with the terminals carefully labeled.

b) Find the **Norton** equivalent of the circuit shown in Figure 2 at terminals ϕ, δ. Draw the Norton equivalent with the terminals carefully labeled.

c) In Figure 3, the two circuits shown in Figures 1 and 2 have been connected. Find the **Thevenin** equivalent of the new circuit at terminals a, b.

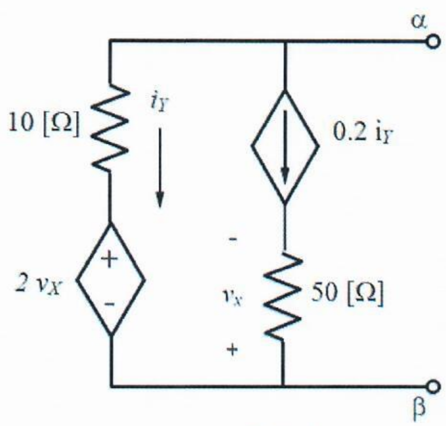


Figure 1

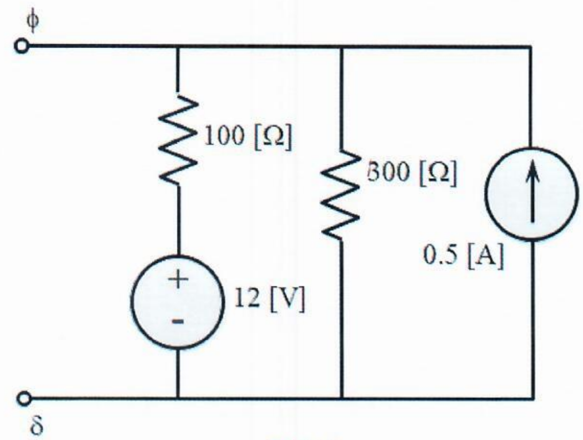


Figure 2

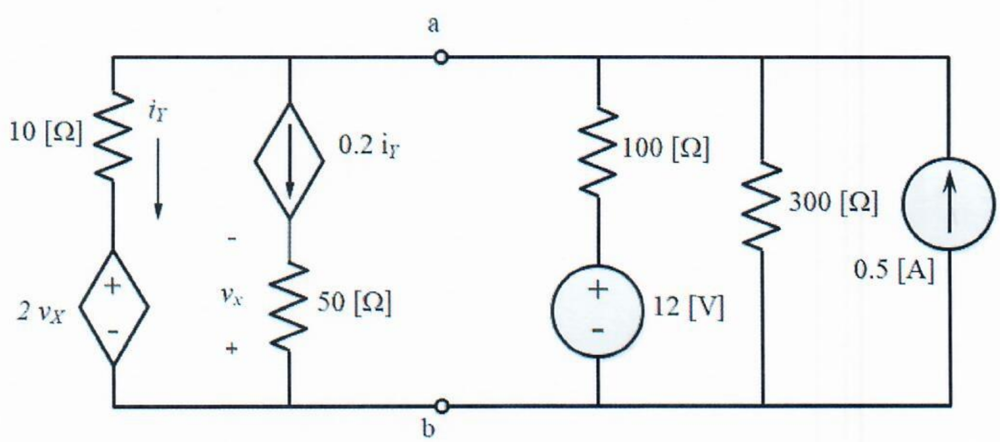
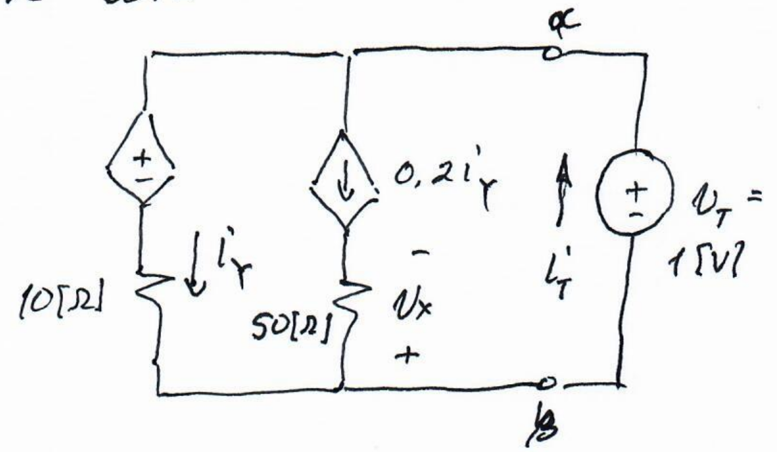


Figure 3

Parts a and b are on page 2...

Room for extra work

a) There are no independent sources here, so v_{oc} and i_{sc} are both 0. So we need a test source:

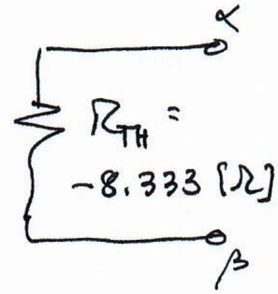


$$i_T = 1.2\, i_Y$$

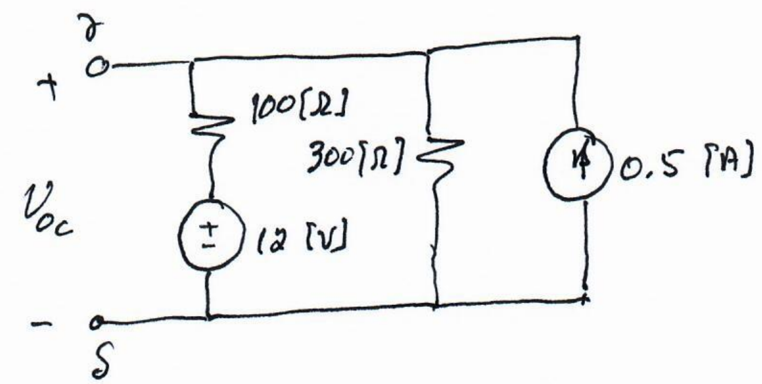
$$2v_x + 10 i_Y - 1 = 0$$

$$v_x = -10 i_Y$$

$\rightarrow i_T = -0.12\,[A] \Rightarrow R_{TH} = -8.333\,[\Omega]$



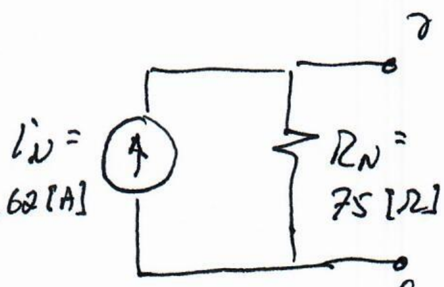
b)



$$\frac{V_{oc}}{300} - 0.5 + \frac{V_{oc} - 12}{100} = 0 \Rightarrow V_{oc} = V_{TH} = 46.5\,[V]$$

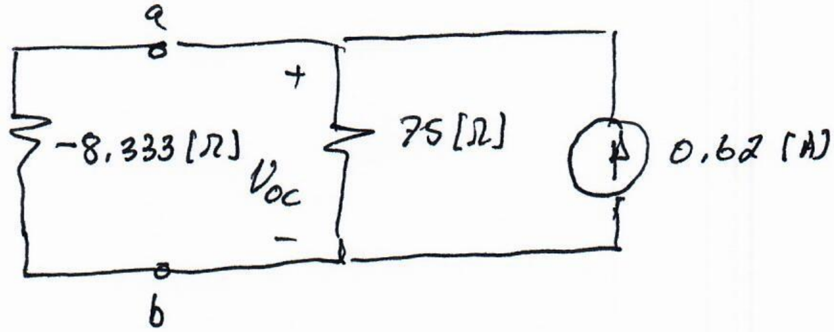
By inspection (or apply a test source), $R_{TH} = R_N = 100 \| 300 = 75\,[\Omega]$

$i_{sc} = i_N = V_{oc}/R_N = 0.62\,[A]$



Room for extra work

c) we can work on the newly-created circuit or we can use the results we already have:



$$R_{TH} = 75 // -8.333 = -9.375 \ [\Omega]$$

$$v_{OC} = v_{TH} = 0.62 \cdot \frac{-8.333}{75 - 8.333} \cdot 75 = -5.8122 \ [V]$$