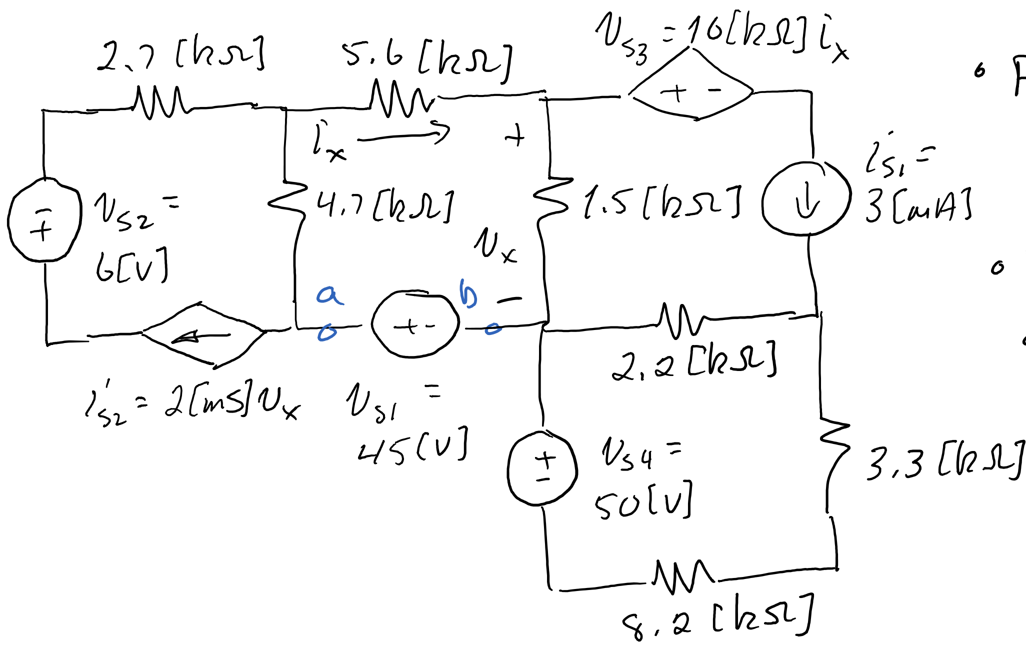
Exam 2 Sp 2006

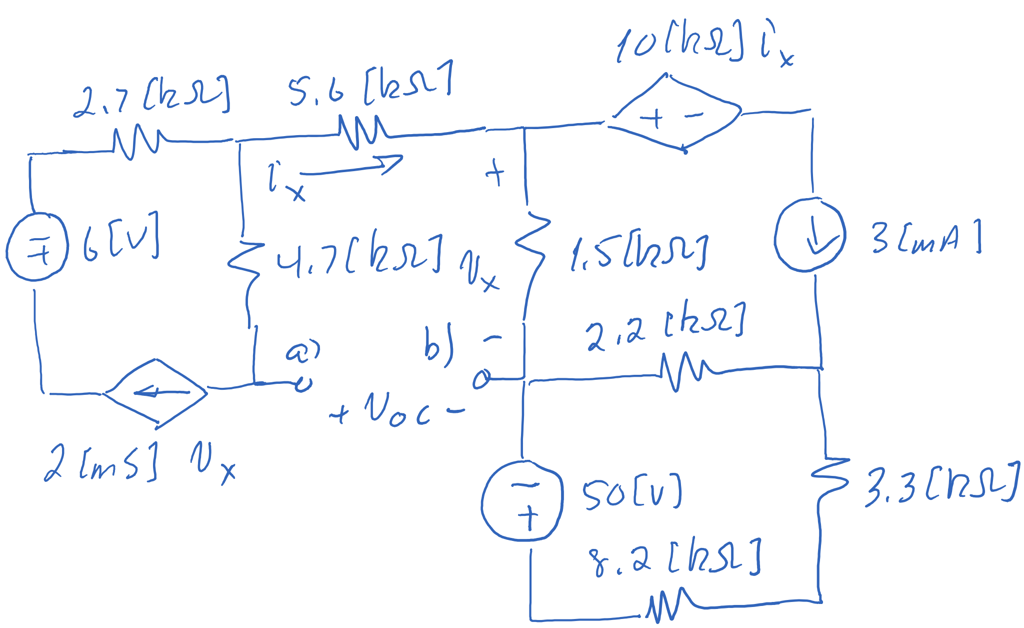
Wednesday, November 15, 2017 5:27 PM



- Find Thevenin Equiv. seen by v_{S1}.
- Find the power delivered by v_{S1}

We define terminals a, b, so that we can keep track of polarities. We need two of v_{oc}, i_{sc}, R_{th} via test source. We will do all three. It turns out that i_{sc} is the longest!

v_{oc}:



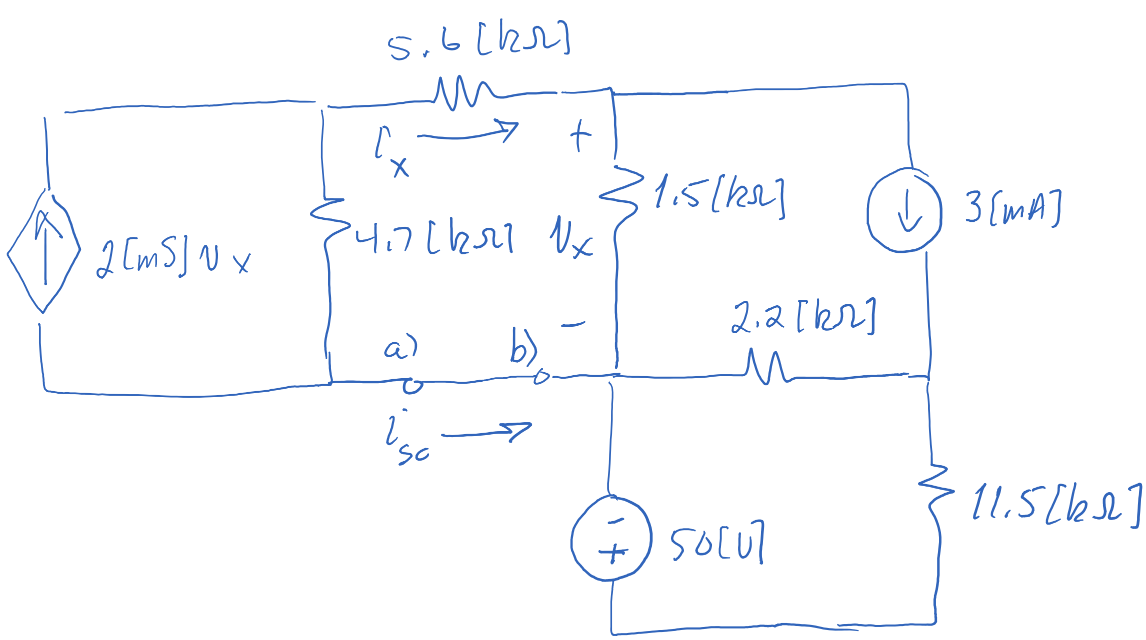
$i_x = 0$

KVL $\quad v_{oc} - v_x + 2[mS]\,v_x\,(4700) = 0$

$v_x = -3[mA](1500)$

That's all we need!! $\quad v_{oc} = v_{th} = 37.79\ [V]$

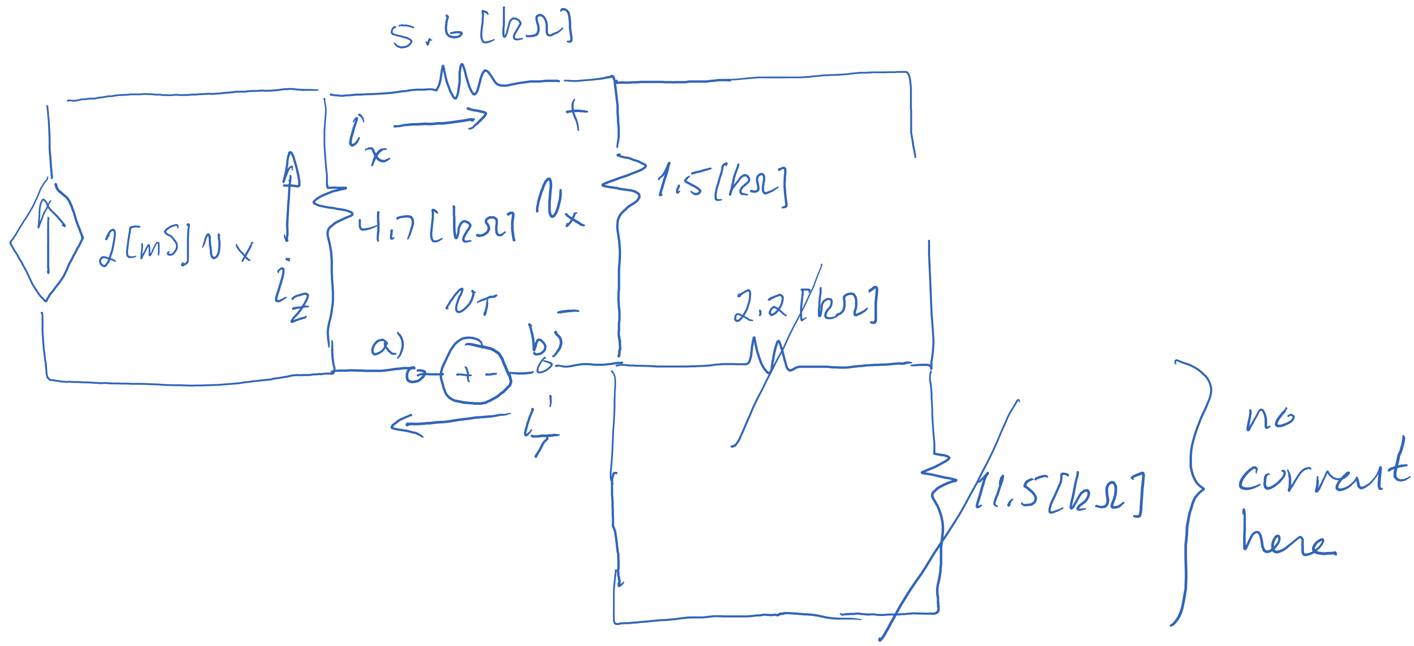
i_{sc}:



Nothing fancy here, except that I have removed circuit elements in series with the two current sources. Other than that, the mesh current method makes sence because the two current sources mean that two mesh currents are already known. This is clearly the hardest of the three things we can find. Solution:

$$i'_{SC} = -16.43\ [mA]$$

test source:



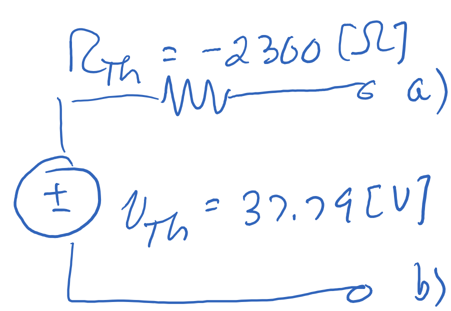
$$v_x = 1500\ i_T$$

$$0.002\, v_x + i_Z = i_T \Rightarrow i_Z = i_T - 3 i_T = -2 i_T$$

$$-v_T + 4700(-2 i_T) + 7100\, i_T = 0$$

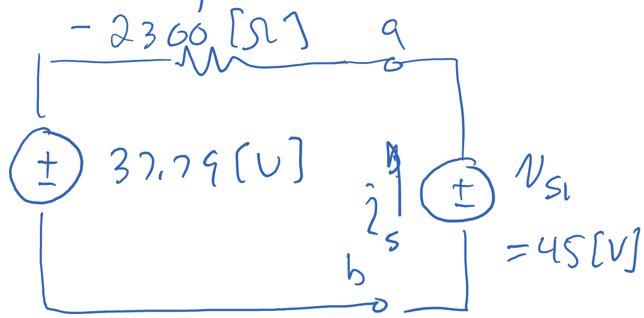
$$R_{Th} = \frac{v_T}{i_T} = (-9400 + 7100) = -2300\ [\Omega]$$

So Thevenin Equivalent is:



Power:

Connecting v_{s1} to the Thev. Eq. gives



$$i_s = \frac{45 - 37.79}{2300}$$

$$= -3.13 \text{ [mA]}$$

$$P_{\text{del by } v_{s1}} = v_{s1} \cdot i_s = -141 \text{ [mW]}$$