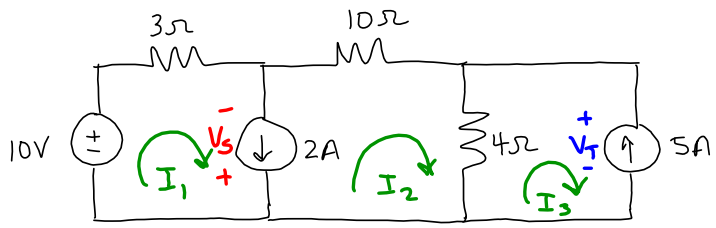


Find V_x and power, using mesh analysis

Know: $I_3 = -5A$ *

$V_x = -10 I_2$

$I_1 - I_2 = 2A$ *

m1: $10 - 3I_1 + V_S = 0$ *

m2: $-V_S - 10I_2 - 4(I_2 - I_3) = 0$ *

m3: Don't need $[-4(I_3 - I_2) - V_T = 0]$

add m1 & m2: $10 - 3I_1 + \cancel{V_S} - \cancel{V_S} - 10I_2 - 4(I_2 - I_3) = 0$ (-5)

$-3I_1 - 14I_2 = 10$

$I_1 - I_2 = 2$

$I_1 = 1.06A$

$I_2 = -0.94A$

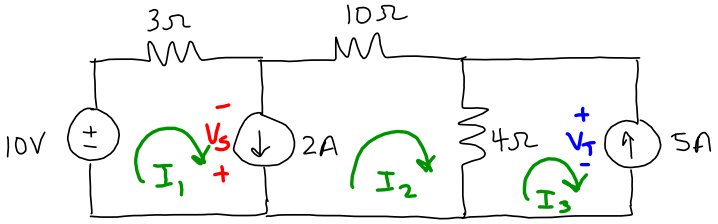
$V_x = 9.41V$

using m1:

$V_S = 3I_1 - 10$

$= -6.82V$

using m3: $V_T = -4(I_3 - I_2) = 16.24V$



Resistors: $P = I^2R$

3Ω: $P = I_1^2(3) = 3.37W$, Abs

10Ω: $P = I_2^2(10) = 8.84W$, Abs

4Ω: $P = (I_2 - I_3)^2(4) = 65.93W$, Abs

$\Sigma P_{abs} = 78.14W$

Sources: $P = VI$

10V: $P = (10)I_1$

$= 10.60W$, Del

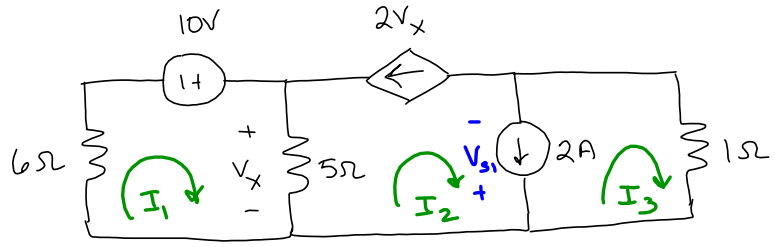
5A: $P = V_T(5)$

$= 81.20W$, Del

2A: $P = V_S(2)$

$= -13.64W$, Del

$\Sigma P_{del} = 78.16W$



Find V_x and power delivered by $2V_x$ source using Mesh analysis

Know :

$I_2 = -2V_x$

$I_2 - I_3 = 2\,A$

$V_x = 5(I_1 - I_2)$

from Knowns

$I_2 = -2(5(I_1 - I_2))$

$I_2 = -10I_1 + 10I_2$

$-10I_1 + 9I_2 = 0$

M1: $-6I_1 + 10 - 5(I_1 - I_2) = 0$

M2: Don't need yet

M3: $-V_{s1} - 1I_3 = 0$ $\quad [V_{s1} = -1I_3 = -0.04V]$

M1: $-11I_1 + 5I_2 = -10$

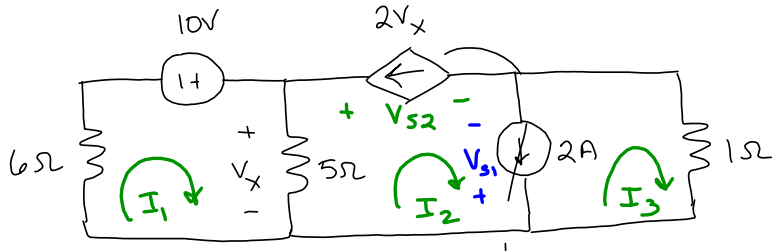
Solve

$I_1 = 1.84\,A$

$I_2 = 2.04\,A$

$I_3 = I_2 - 2 = 0.04\,A$

$V_x = -1.02\,V$



M2: $-5(I_2 - I_1) - V_{s2} + V_{s1} = 0$

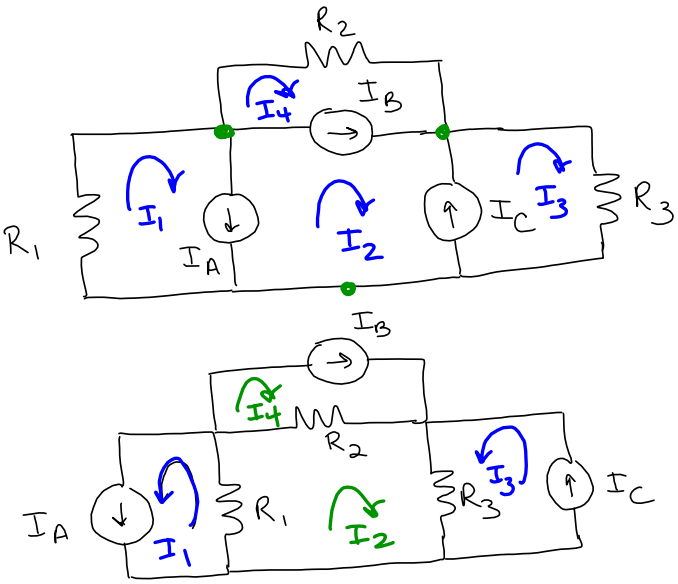
$V_{s2} = V_{s1} - 5(I_2 - I_1)$

$= -1.06\,V$

$P = VI$

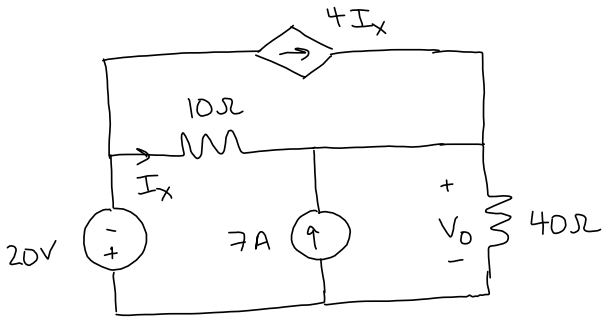
$= V_{s2}(2V_x)$

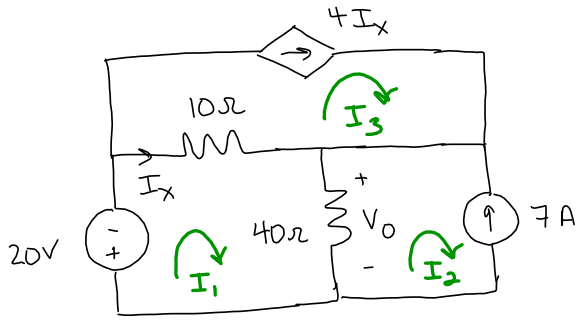
$= 2.16\,W$, Del



$$m2: \; -R_1(I_1+I_2) - R_2(I_2-I_4) - R_3(I_2+I_3) = 0$$

Find I_x and V_o.





Know:

$I_2 = -7A$

$I_3 = 4I_x$

$I_x = I_1 - I_3$

$V_o = 40(I_1 - I_2)$

-7

M1: $-20 - (I_1 - I_3)10 - (I_1 - I_2)40 = 0$

$-50I_1 + 10I_3 = 300$

$I_3 = 4(I_1 - I_3)$

$I_3 = 4I_1 - 4I_3$

$4I_1 - 5I_3 = 0$

$I_1 = -7.14\ A$

$I_3 = -5.71\ A$

$I_x = I_1 - I_3$

$I_x = -1.43\ A$

$V_o = -5.71\ V$