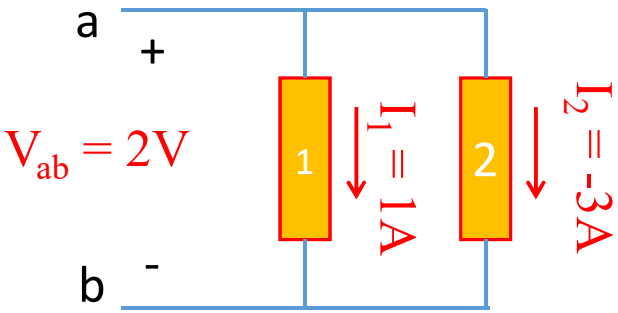
EECS/CSE 70A Network Analysis I

Homework #1

Due on or before
4/12/2018, Thursday 11 am at ELH 110

Problem 1: Find the power absorbed or supplied by each element. (2 pts)



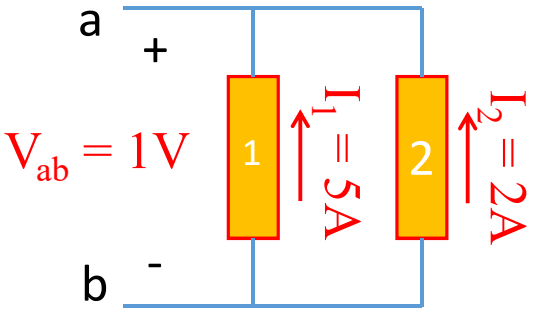
Solution:

$P_1 = V_{ab}I_1$ and $P_2 = V_{ab}I_2$

→ $P_1 = (2V)x(1A) = 2W$ **0.5** and $P_2 = (2V)x(-3A) = -6W$ **0.5**

$P_1 > 0$, therefore the element is a power sink (it absorbs power), **0.5** $P_2 < 0$, therefore the element is a power source (it supplies power) **0.5**

Problem 2: Find the power absorbed or supplied by each element. (2 pts)



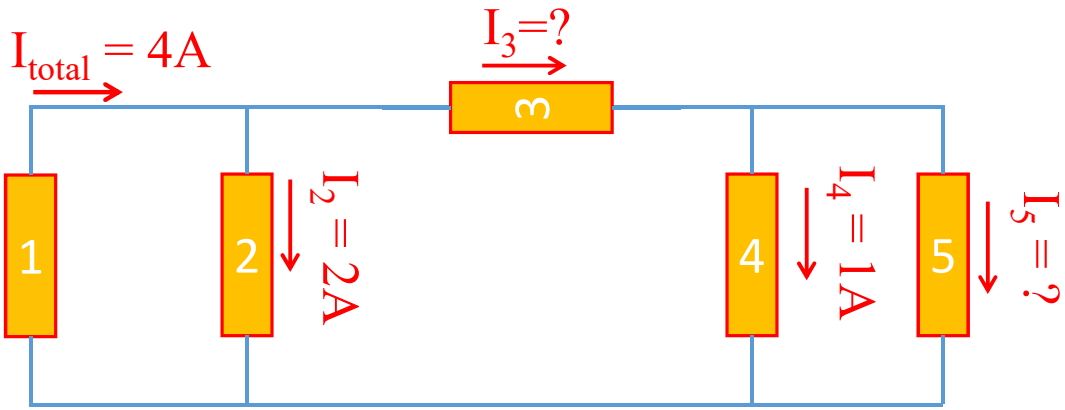
Solution:

$P_1 = V_{ab}(-I_1)$ and $P_2 = V_{ab}(-I_2)$

→ $P_1 = (1V)x(-5A) = -5W$ **0.5** and $P_2 = (1V)x(-2A) = -2W$ **0.5**

$P < 0$, therefore both elements are power source (they supply power) **1**

Problem 3: Find the current I_3 and I_5 flowing through elements 3 and 5. (2 pts)



Solution:

$I_{total} = I_2 + I_3 \rightarrow 4A = 2A + I_3 \rightarrow I_3 = 2A$ **1**

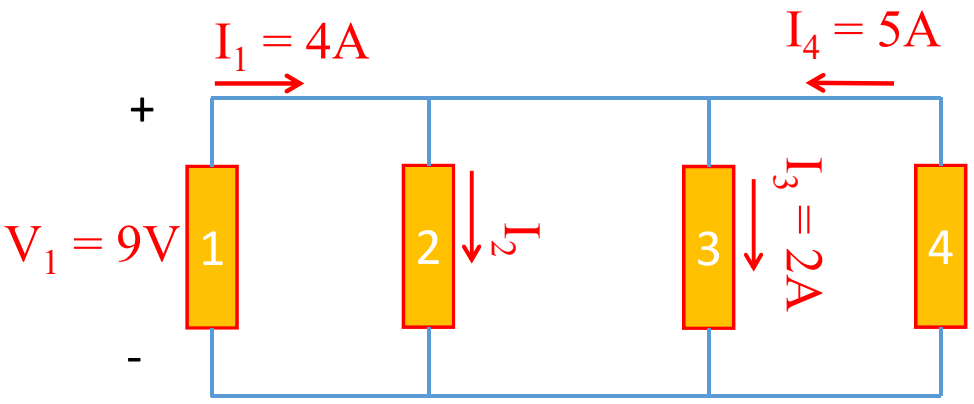
$I_3 = I_4 + I_5 \rightarrow I_5 = 2A - 1A = 1A$ **1**

Problem 4: (4pts)

a) Find I_2

b) Find the power absorbed or supplied by each element.

c) Is element 1 a source or a sink? Repeat for elements 2, 3 and 4.



Solution:

(a) $I_2 = I_1 + I_4 - I_3 \rightarrow I_2 = 4A + 5A - 2A = 7A$ **1**

(b)

$P_1 = V_1 I_1 \rightarrow P_1 = 9V \times (-4A) = -36W$ (supplied). **0.5**

Similarly:

$P_2 = 9V \times 7A = 63W$ (absorbed) **0.5**

$P_3 = 9V \times 2A = 18W$ (absorbed) **0.5**

$P_4 = 9V \times (-5A) = -45W$ (supplied) **0.5**

(c) Power is positive for elements 2 and 3, negative for elements 1 and 4. Thus 1 and 4 are power source. **0.5** Elements 2 and 3 are power sinks. **0.5**