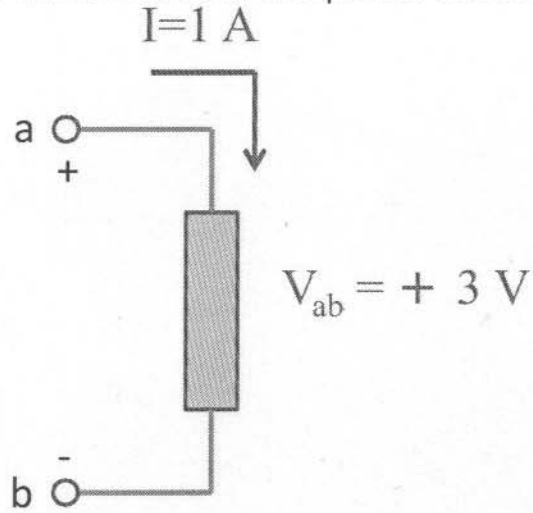


EECS 70A: Network Analysis

Homework #1

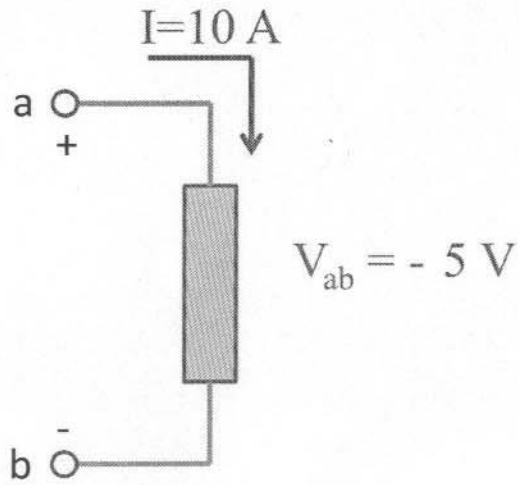
Due in discussion section,
Wednesday, April 7, 2010.

Problem 1: Find the power absorbed or supplied by the element.



$$\begin{aligned} P &= I \cdot V \\ &= I_{ab} \times V_{ab} \\ &= 1 \text{ A} \times 3 \text{ V} = \boxed{3 \text{ W}} \end{aligned}$$

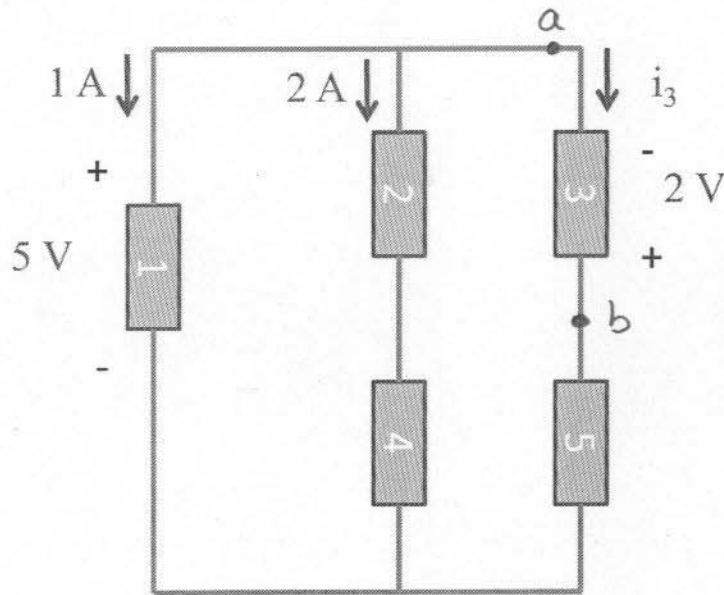
Problem 2: Find the power absorbed or supplied by the element.



$$\begin{aligned} P &= I \cdot V \\ &= I_{ab} \times V_{ab} \\ &= 10 \text{ A} \times -5 \text{ V} = \boxed{-50 \text{ W}} \end{aligned}$$

Problem 3:

- Find i_3 .
- Find the power absorbed or supplied by element 3.
- Is element 3 a source or a sink?



a) KCL: $I_1 + I_2 + I_3 = 0$

$$1A + 2A + i_3 = 0$$

$$i_3 = -3A$$

b) $P = I_3 \cdot V_{ab}$

$$= (-3A) \cdot (-2V)$$

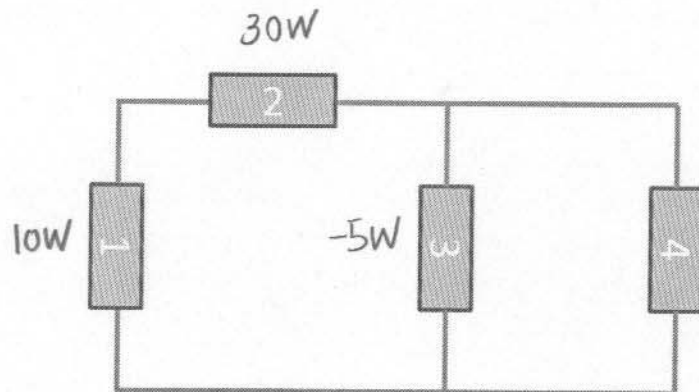
$$= 6W$$

c) Element 3 is a Sink.

Problem 4: (Power balance)

Assume $P_1 = 10 \text{ W}$, $P_2 = 30 \text{ W}$, $P_3 = -5 \text{ W}$.

Find the power absorbed or supplied by element 4. Is it a source or a sink?



$$\sum P = 0 \iff P_1 + P_2 + P_3 + P_4 = 0$$

$$P_4 = -(P_1 + P_2 + P_3)$$

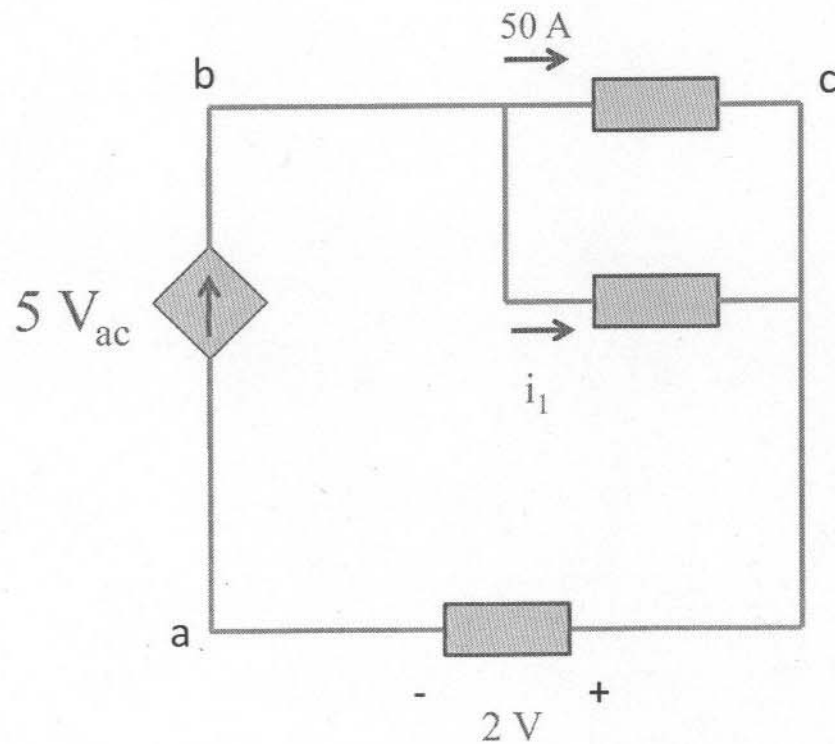
$$= -(10 + 30 - 5)$$

$$= \boxed{-35 \text{ W}}$$

Problem 5: (VCCS)

Find i_1 .

Is current flowing from b to c or from c to b?



To find i_1 :

• KCL @ node b

$$5V_{ac} = 50A + i_1$$

$$V_{ac} = -2V$$

$$i_1 = 5(-2) - 50A$$

$$i_1 = -60A$$

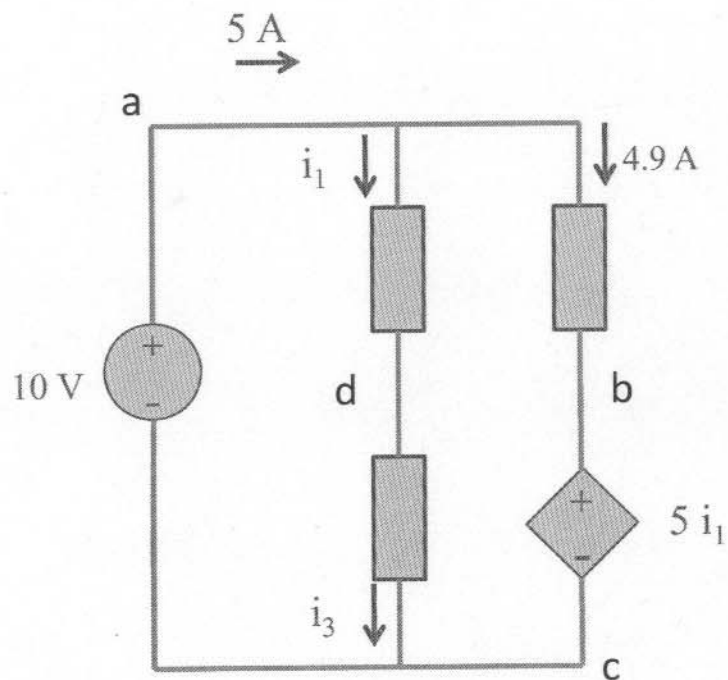
Since i_1 has negative current, this indicates that current is flowing from

$$C \text{ to } b$$

Problem 6: (CCVS)

Find i_1, i_3 .

Find V_{bc} .



KCL @ node a :

$$5A = i_1 + 4.9A$$

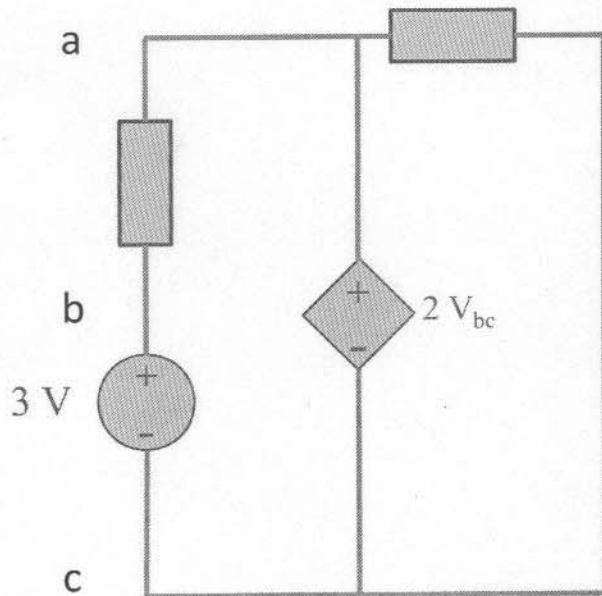
$$\boxed{i_1 = 0.1A}$$

$$\boxed{i_3 = i_1 = 0.1A}$$

$$V_{bc} = 5i_1 = 5(0.1A) \\ = \boxed{0.5V}$$

Problem 7: (VCVS)

Find V_{ac} .



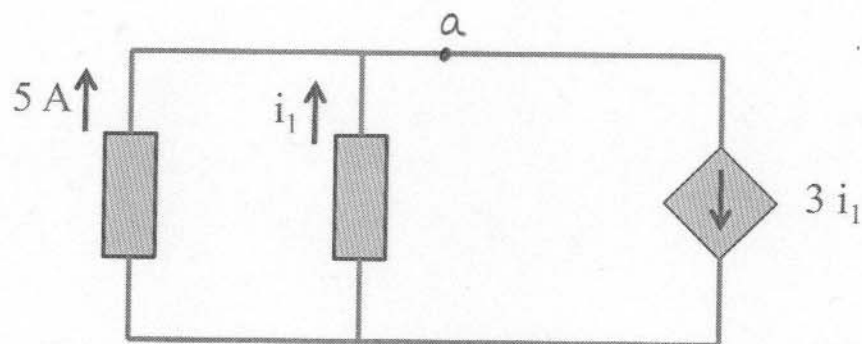
$$V_{ac} = 2V_{bc}$$

$$V_{bc} = 3V$$

$$V_{ac} = 2 \cdot 3 = \boxed{6V}$$

Problem 8: (CCCS)

Find i_1 .



KCL @ node a:

$$5A + i_1 = 3i_1$$

$$5A = 2i_1$$

$$i_1 = 2.5A$$