ECE201 -- Exam 1
February 9, 2010

Division 0101: Prof. Capano (9:30am)
Division 0201: Prof. Tan (10:30 am)
Division 0301: Prof. Jung (7:30 am)
Division 0401: Prof. Capano (11:30am)

INSTRUCTIONS:

- DO NOT OPEN THIS EXAM UNTIL TOLD TO DO SO.
- There are fourteen (14) multiple choice problems worth 7 points each.
- Students who properly identify themselves with name and id number on scantron sheet will receive two extra points.
- To maximize our assessment of your knowledge and understanding, do NOT dwell on a single problem. If you get stuck, move on to the next problem and return later, time permitting.
- This is a closed book, closed notes exam.
- Calculators are allowed but not necessary.

All students are expected to abide by the usual ethical standards of the university, i.e., your answers must reflect only your own knowledge and reasoning ability. Students caught cheating will receive a grade of 'F' for the course.

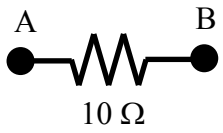
Course Outcomes:

As described in the course syllabus, we must certify that every student who receives a passing grade in this course has satisfied each of the course outcomes. On this exam, you have the opportunity to satisfy outcomes i, ii, and iii. On the chart below, we list the criteria we use for determining whether you have satisfied these course outcomes.

Course Outcome	Exam Questions	Total Points Possible	Minimum Points required to satisfy course outcome
i	1,2,4,5,7,9,11,12	56	28
ii	6,8,10,13	28	14
iii	3,14	14	7

If you fail to satisfy any of the course outcomes, don't panic. There will be more opportunities for you to do so later on.

1. A quantity of positive charge passing through the resistor from "B" to "A" is q(t) = 4t (in Coulombs)

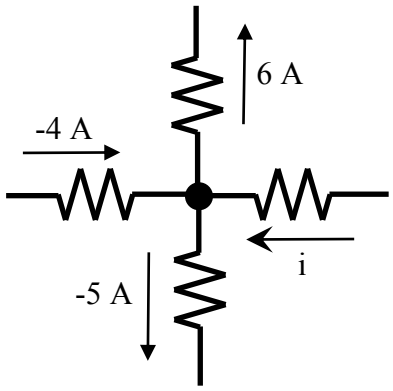


Find V_{AB} (in V):

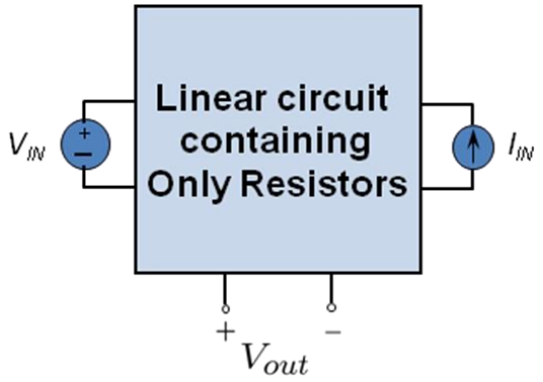
(1) 10
(2) −10
(3) 20
(4) −20
(5) 30
(6) −30
(7) 40
(8) −40

2. Determine the unknown current, i (in A):

(1) 1 (2) −2 (3) 3 (4) −4 (5) 5 (6) −6
(7) 7



3. There is a circuit that has only resistors in it. It has two input ports: one for a voltage input (V_{IN}) and another one for a current input (I_{IN}). The output V_{OUT} is measured at two different sets of input conditions, and the results are shown below in the table. Using the two measurement results, find V_{OUT} when V_{IN} = 15V and I_{IN} = −3A.

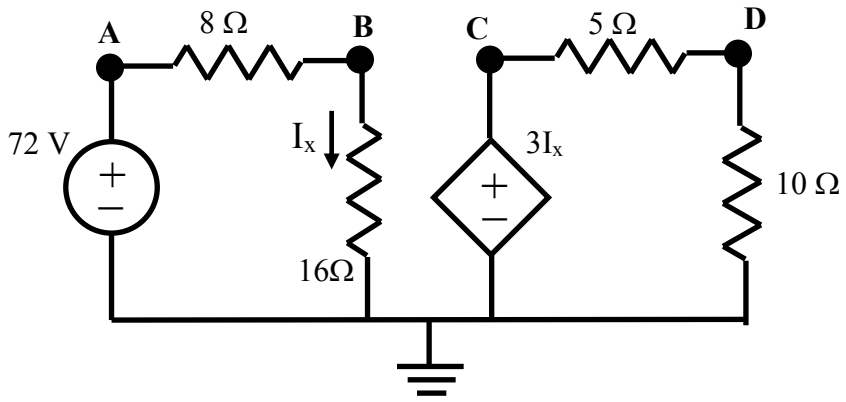


V_{IN}	I_{IN}	V_{OUT}
20 V	2 A	2 V
10 V	4 A	6 V
15 V	–3 A	?

(1) 2 V
(2) 4 V
(3) 6 V
(4) 8 V
(5) –2 V
(6) –4 V
(7) –6 V

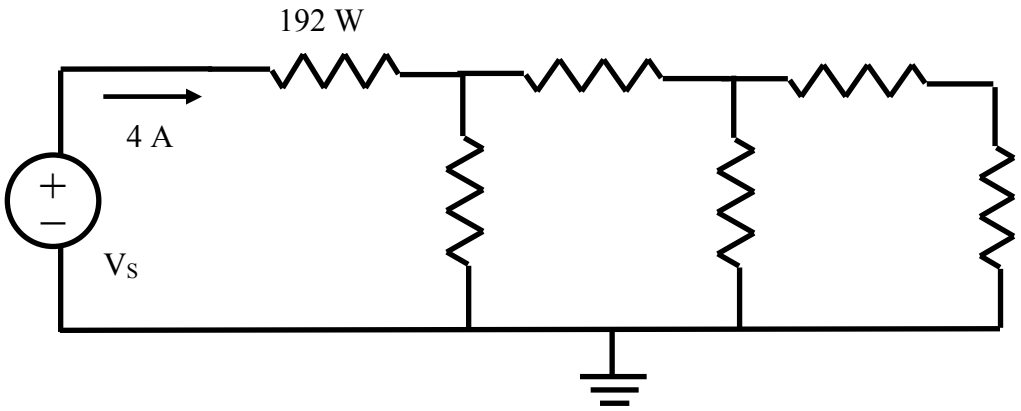
4. Find the voltage V_{BC} (in V):

(1) 12 (2) 26 (3) 39 (4) 48 (5) 0 (6) 6 (7) 24



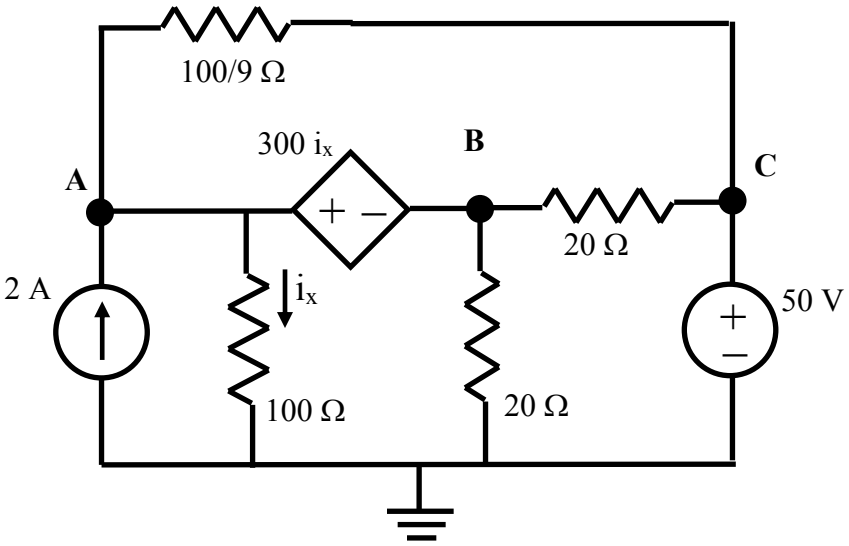
5. In the circuit below, it is known that the voltage source supplies a current of 4A to the resistors. ALL resistors have the same resistance, and the power dissipated by the first resistor is 192 W. Find the power delivered by the voltage source (in Watts):

(1) 1152 (2) 288 (3) 312 (4) 440 (5) 572 (6) 625 (7) 750

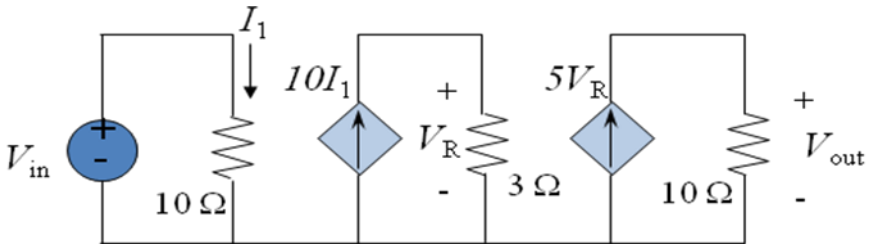


6. Find the current i_x in the circuit below (in A):

(1) 0.33 (2) –0.33 (3) 2 (4) –4.3 (5) –0.9 (6) 3.33 (7) 0.75

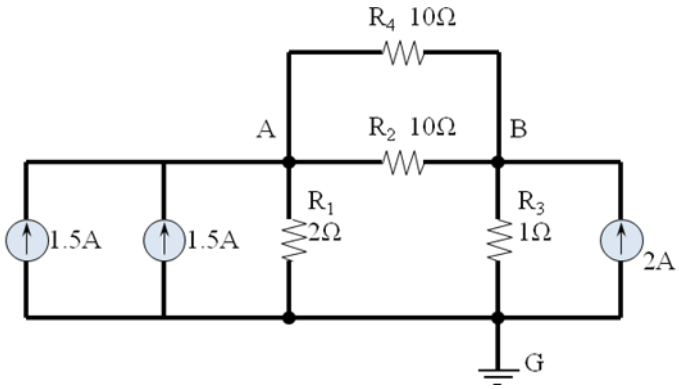


7. For the circuit shown below, find V_{out} (in V).



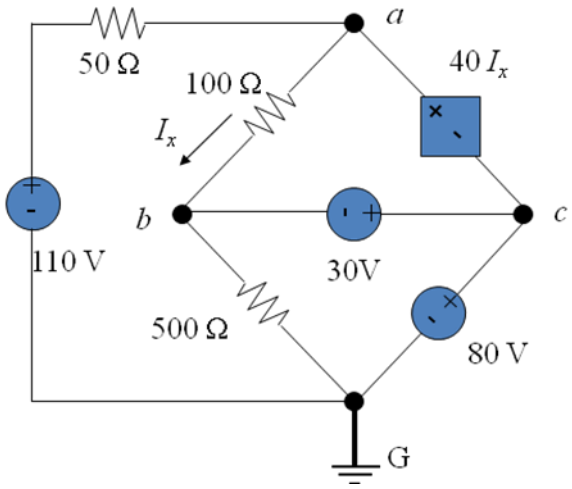
(1) $V_{out} = 50 \cdot V_{in}$ (2) $V_{out} = 100 \cdot V_{in}$
(3) $V_{out} = 150 \cdot V_{in}$ (4) $V_{out} = 200 \cdot V_{in}$
(5) $V_{out} = 250 \cdot V_{in}$ (6) $V_{out} = 300 \cdot V_{in}$
(7) $V_{out} = 350 \cdot V_{in}$

8. For the circuit shown below, find V_{AB}.



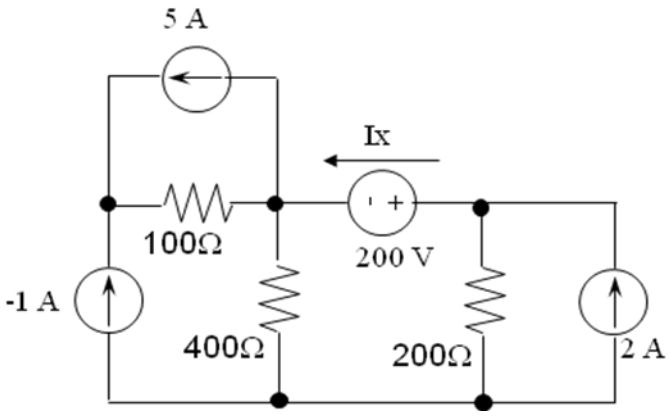
(1) 2.5 V
(2) 5.0 V
(3) 7.5 V
(4) 2.0 V
(5) 4.0 V
(6) 6.0 V
(7) 8.0 V

9. For the circuit shown below, find V_a.



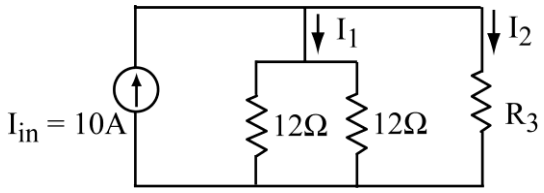
(1) 20 V
(2) 40 V
(3) 60 V
(4) 80 V
(5) 100 V
(6) 120 V
(7) 140 V

10. For the circuit shown below, find I_X.



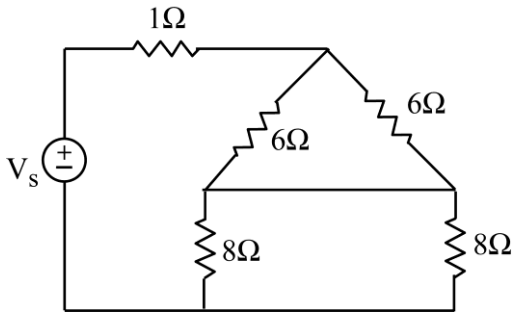
(1) 0.5 A
(2) 1.0 A
(3) 1.5 A
(4) 2.0 A
(5) 2.5 A
(6) 3.0 A
(7) 3.5 A

11. Find the value of R_3 in the circuit below, so that $I_2 = 6$ A.



(1) 1 Ω
(2) 2 Ω
(3) 3 Ω
(4) 4 Ω
(5) 5 Ω
(6) 6 Ω
(7) 7 Ω
(8) 8 Ω

12. Find the equivalent resistance R_{eq} as seen by the voltage source V_S.



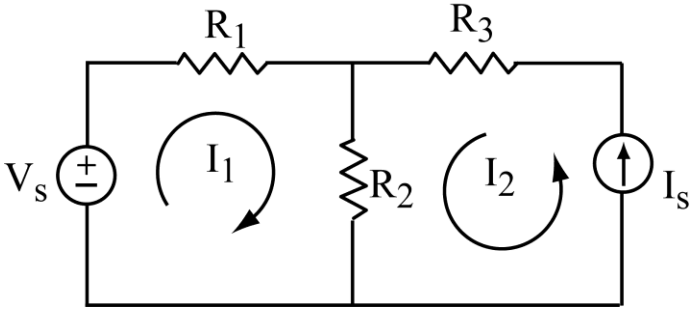
(1) 1 Ω (2) 2 Ω (3) 3 Ω (4) 4 Ω

(5) 5 Ω (6) 6 Ω (7) 7 Ω (8) 8 Ω

13. The loop equations for the circuit shown below are as follows:

$$\begin{bmatrix} 25 & 20 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} V_S \\ I_S \end{bmatrix}$$

For $R_2 = 20\ \Omega$, find the value of R_1.



(1) 1 Ω (2) 2 Ω (3) 3 Ω (4) 4 Ω

(5) 5 Ω (6) 6 Ω (7) 7 Ω (8) 8 Ω

14. We are trying to calculate i_1 using superposition. First, we calculate $i_1^{(1)}$ with only the voltage source active as shown in Figure (1). Second, we calculate $i_1^{(2)}$ with only the current source active as shown in Figure (2). Find $i_1^{(1)}$, $i_1^{(2)}$, and i_1.

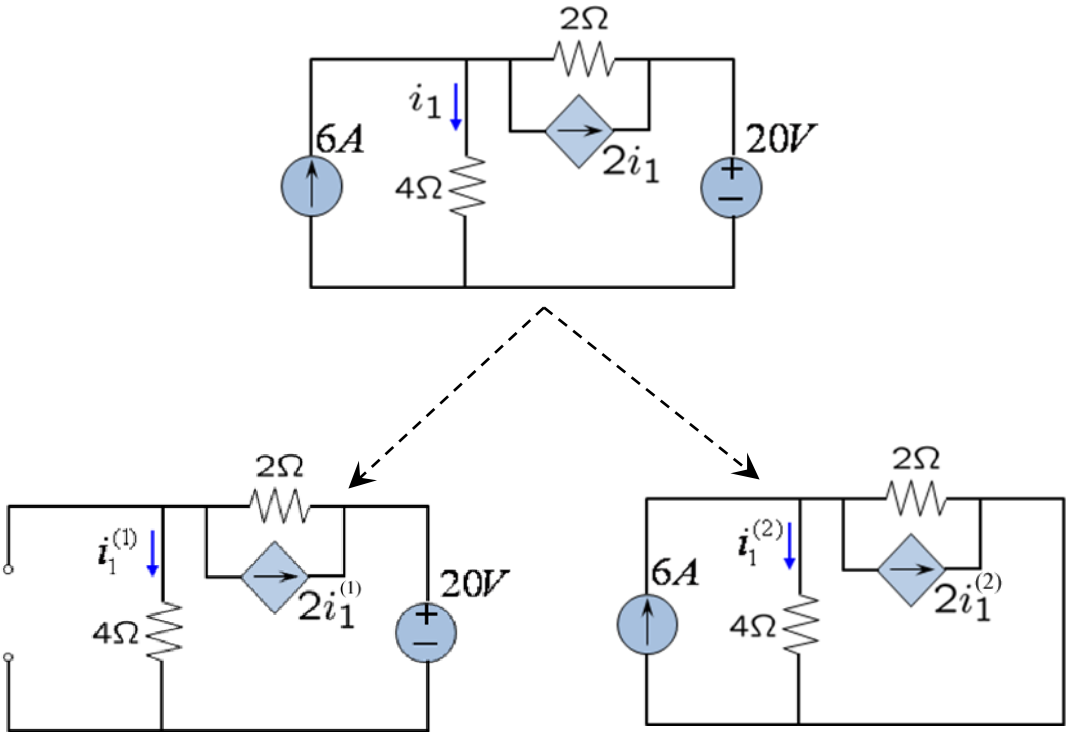


Figure (1)

Figure (2)

(1) $i_1^{(1)}$=1A, $i_1^{(2)}$=0.6A, and i_1=1.6A

(2) $i_1^{(1)}$=2A, $i_1^{(2)}$=1.2A, and i_1=3.2A

(3) $i_1^{(1)}$=1A, $i_1^{(2)}$=0.6A, and i_1=0.4A

(4) $i_1^{(1)}$=2A, $i_1^{(2)}$=1.2A, and i_1=0.8A

(5) $i_1^{(1)}$=1A, $i_1^{(2)}$=0.6A, and i_1=-0.4A

(6) $i_1^{(1)}$=2A, $i_1^{(2)}$=1.2A, and i_1=-0.8A

(7) $i_1^{(1)}$=1A, $i_1^{(2)}$=1.2A, and i_1=2.2A