ECE 209 — Exam # 1

Estimated time for completion: <1.25 hour
29 September 2016

Rules of the Exam

Rule 1: The examination period begins at 11:00am on Thursday 29 September 2016 and ends at 12:15pm on Thursday 29 September 2016.

Rule 2: There are four problems.

Rule 3: The exam is closed book and closed notes. You may have an 8.5" x 11" sheet of paper with notes and a calculator.

Rule 4: To receive full credit for an answer include the units along with the numerical answer.

Rule 5: Show all work - answers without supporting work will not receive credit.

_____

Name

Problem 1 (20 points)

Two electric circuits, represented by boxes **A** and **B**, are connected as shown in the figure below. The reference direction for the current i and the reference polarity of the voltage v are also shown.
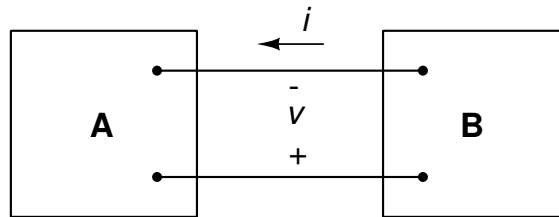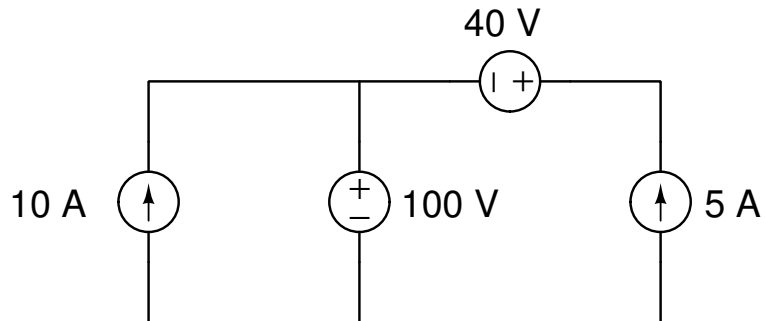

For each set of values of i and v in the table below, calculate the absolute value of the power associated with circuit **B** and indicate if circuit **B** is generating or absorbing power.

Condition	i	v	|Power|	Generating or Absorbing
1	10 A	5 V		
2	5 A	-24 V		
3	-12 A	24 V		
4	-2.5 A	-1 V		

Problem 2 (20 points)
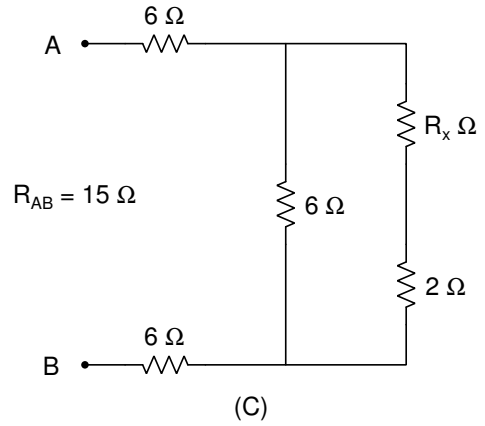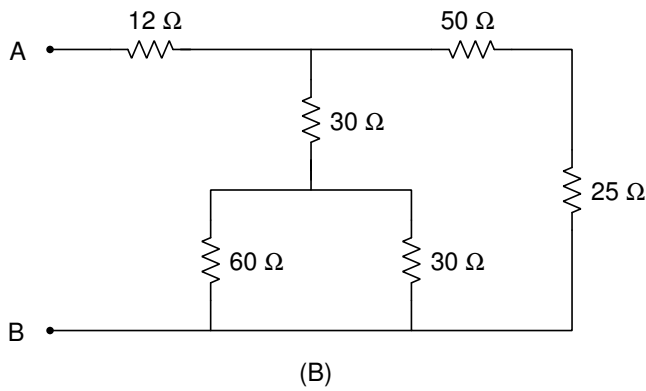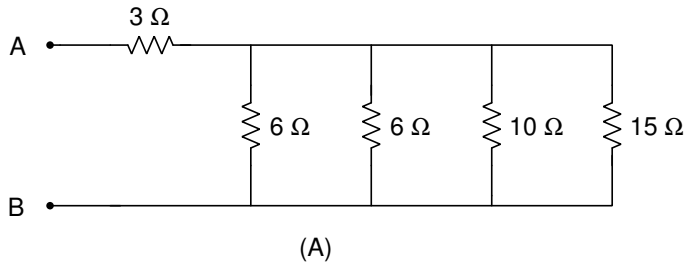
Consider the circuit below:

Is the interconnection valid (yes/no)? _____

If the interconnection is valid, identify the voltage and current sources that generate power by circling them in the figure above.

If the circuit is not valid, explain why:

Problem 3 (30 points)

Consider the three series and parallel resistor combinations below:

(A)

(B)

(C)

For circuits (A) and (B), calculate R_{ab}, the equivalent resistance between terminals A and B:
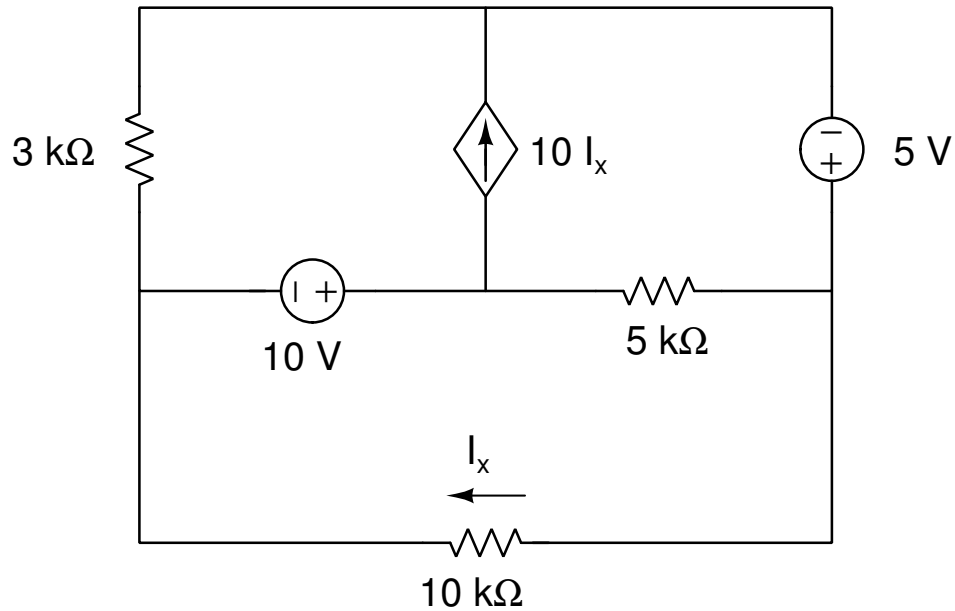
R_{ab} for circuit (A): _____

R_{ab} for circuit (B): _____

For circuit (C), calculate the value of R_x that produces an equivalent resistance between terminals A and B of 15Ω.

R_x for circuit (C): _____

Problem 4 (30 points)

In the circuit shown below, calculate the power associated with each circuit component, the total power generated and the total power dissipated (or absorbed).

Power associated with the 5 V independent source? _____

Power associated with the 10 V independent source? _____

Power associated with the $10I_x$ dependent current source? _____

Power associated with the 3kΩ resistor? _____

Power associated with the 5kΩ resistor? _____

Power associated with the 10kΩ resistor? _____

How much power is generated in the circuit? _____

How much power is dissipated or absorbed in the circuit? _____

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