

ELEC 243
Problem Set 2
Exam Section
Due: January 30, 2015

Exam Cover Sheet

Exam problems begin on the next page.

There is one problem this week. It has a one hour time limit.

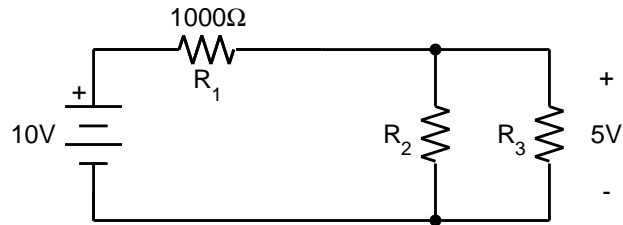
Before beginning you should read the following guidelines:

- All exam problems are pledged work.
- You may not discuss any problem with anyone other than the instructor.
- Unless otherwise specified, you **MAY** utilize:
 - A calculator.
 - Your textbook, class notes, and any material on or *directly* linked to the class web page.
 - A table of integrals.
- Unless otherwise specified, you **MAY NOT** utilize:
 - Matlab or any other computer software.
 - Any reference material other than those listed above.
- “Find” means to determine a numerical value or an algebraic expression for the indicated quantity or function. “Sketch” or “plot” means to draw a graph of the indicated function, not necessarily to accurate scale, but with labeled axes and important values indicated.
- Some problems will have a time limit. This will be indicated at the beginning of the problem itself and on the cover sheet. If no time limit is specified, you may use as much time as desired, subject to the solution being handed in on time.

When you are ready to begin, turn the page.

E2.1 This problem has a one hour time limit.

In the circuit below, R_2 and R_3 have the same value.



- What is the value of R_2 and R_3 ?
- List all the possible values of resistance that can be formed by combinations of R_1 , R_2 , and R_3 .
- Which of the following voltages (measured between any two points in the circuit) can be obtained in circuits built using only the components in the original circuit: 1V, 2V, 3V, 4V, 5V, 6V, 7V, 8V, 9V, 10V?
- For each realizable voltage from the list in part (c), draw the circuit and indicate the points of measurement.
- How many additional voltages from the list (1V, 2V, 3V, 4V, 5V, 6V, 7V, 8V, 9V, 10V) can you get by adding a single resistor of a fixed value to your collection of components? Draw the circuits for the new voltages, and give the value of the new resistor.

Note: for parts (c) and (e), your circuit must produce the exact voltage specified (assuming ideal components). Close doesn't count.