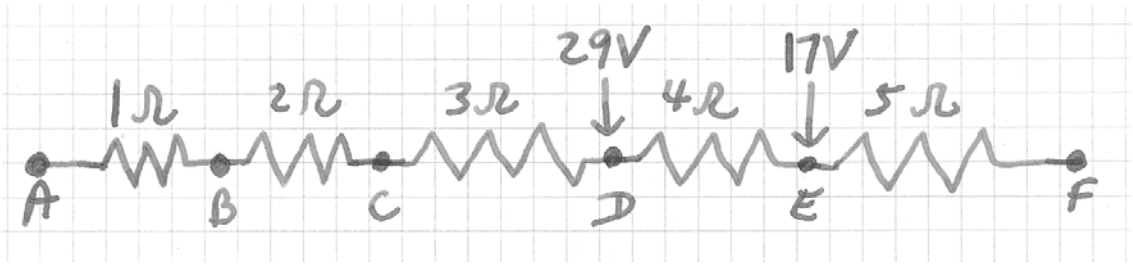
HOMEWORK - TUESDAY, JUNE 28, 2005

1. A piece of an electric circuit consists of five resistors connected as shown below. The electric potential at two points is shown.



(a) Determine the electric current in this part of the circuit and show its direction on the diagram.

(b) Fill out the $R - I - \Delta V$ table for these resistors:

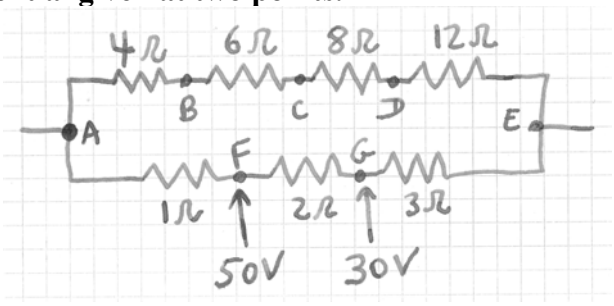
R	I	ΔV
1 Ω		
2 Ω		
3 Ω		
4 Ω		
5 Ω		

(c) Determine the electric potential at each of the other labeled points.

(d) What is the equivalent resistance R_{eq} of this part of the circuit?

(e) Determine the value of IR_{eq} and identify the result with some potential difference you find on the circuit.

2. Here is a more complicated piece of an electric circuit, with the resistances shown and the electric potential given at two points.



(a) Explain why there are only two different electric currents in this piece of circuit, and show where they flow, labeling them I_1 and I_2 in any way you want.

(b) Determine the values of the electric currents I_1 and I_2.

(c) Label the electric potential at each of the labeled points on the circuit.

(d) Fill out the $R - I - \Delta V$ table for these resistors:

R	I	ΔV
1 Ω		
2 Ω		
3 Ω		
4 Ω		
6 Ω		
8 Ω		
12 Ω		

(e) A separate table can be constructed for each branch of the circuit, in which the value of R is the equivalent resistance of that branch, I is the current in that branch, and ΔV is the potential difference between the end of the branch. Determne the table entries for the top and bottom branches:

	R	I	ΔV
top branch			
bottom branch			

(f) Finally, a single-row table can be constructed for this part of the circuit, in which I is the sum of the two currents and ΔV is the potential difference between the left and right ends of the circuit element. Fill it in and determine the entry for R. Does it bear any obvious relationship to the equivalent resistances of the two branches? (If you see one, specify it. If not, admit that there is no obvious relationship.)

R	I	ΔV