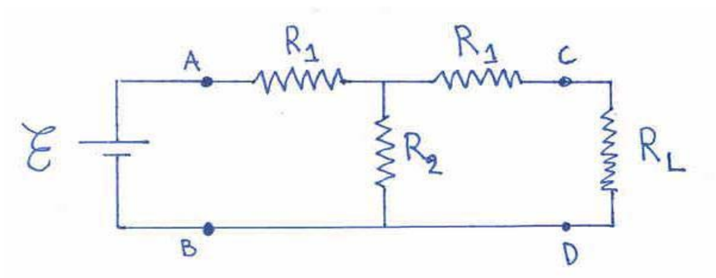
Practice Quiz - Week #6 - 8.022

10 minutes, 10 points total

This is not assigned or required homework. Work on your own, if you wish and check your answers against the provided solutions.

The emf source *E* is connected as shown in the figure below in a network that involves resistors R_1 , R_2 and R_L



- **Introduce on the figure above, arrows indicating the emf and the electric currents *i* flowing in the branches (1 point).**
- **Write down a system of equations enough to calculate the currents flowing on the resistors (the ones you have just indicated on the plot). You are NOT asked to solve the system of equations- only to identify it! (3 points).**
- **What is the effective resistance R_eff that the emf "sees", i.e., what is the total resistance to the "right" of points A and B identified on the plot (2 point).**
- **In what follows, assume that R_1 and R_2 are magicaly adjusted so that the effective resistance we have just calculated is equal to R_L.**
    - **Find R_2 in terms of R_1 and R_L (2 points).**
    - **Find the voltage drop on R_L (i.e. V_C - V_D as identified on the figure) as a function of *E*, R_1 and R_L (2 points).**

My recommendation is to apply Kirchhoff's 2nd law on the outer most loop; replace the currents involved in this equation as ratios of voltages over resistors. Make use of the R_eff you have already calculated to find the current that flows on R_1.