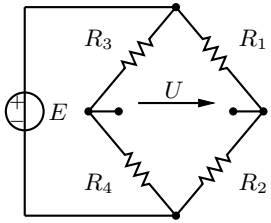
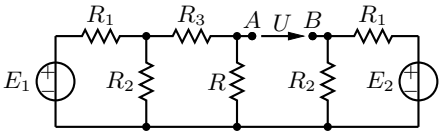
Problem Set 3

Problem 1. Find voltage U.



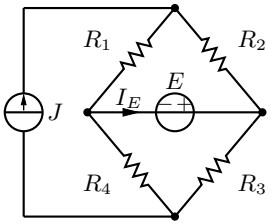
Answer. $U = E\left(\frac{R_2}{R_1+R_2} - \frac{R_4}{R_3+R_4}\right)$.

Problem 2. Find the value of R for which $U = 0$. Use the voltage divider formula. The following data is given: $E_1 = 15\,\mathrm{V}$, $E_2 = 4\,\mathrm{V}$, $R_1 = 2\,\mathrm{k\Omega}$, $R_2 = 6\,\mathrm{k\Omega}$, $R_3 = 4\,\mathrm{k\Omega}$.



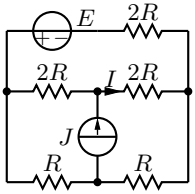
Answer. $R = 2\,\mathrm{k\Omega}$.

Problem 3. Using superposition rule, find current I_E. Give the conditions under which $I_E = 0$.



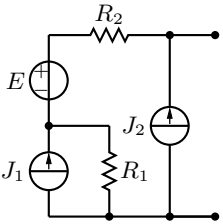
Answer. $I_E = E\left(\frac{1}{R_1+R_2} + \frac{1}{R_3+R_4}\right) + J\left(\frac{R_2}{R_1+R_2} - \frac{R_3}{R_3+R_4}\right)$. $I_E = 0$ if $E = J\frac{R_1R_3-R_2R_4}{R_1+R_2+R_3+R_4}$.

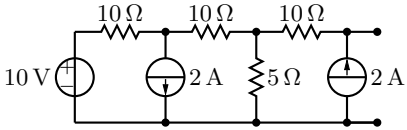
Problem 4. Using superposition rule find current I. The following data is given: $E = 24\,\mathrm{V}$, $J = 1.2\,\mathrm{A}$, $R = 1\,\Omega$.



Answer. $I = \frac{J}{2} + \frac{E}{10R}$.

Problem 5. Using superposition rule find voltages across the following 1-ports.





Answer. $E + J_2(R_1 + R_2) + J_1 R_1$, $\qquad 26\,\mathrm{V}$.