Circuits with R and C

1. For $R = 10\,\Omega$, $r = 2\,\Omega$, $E = 12\,V$ find

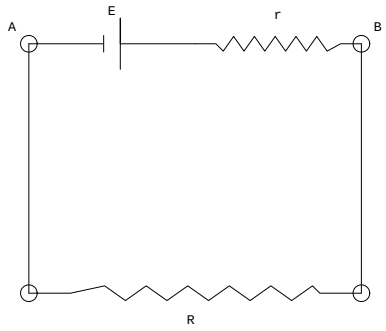
   (a) current I

   (b) V_{AB}

   (c) power P released by the battery

   (d) power P_R on external load; where does the extra power go?

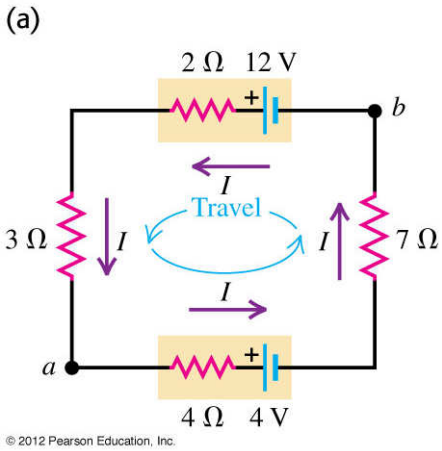
   (e) (*) for which R one gets $P_R = \max$?



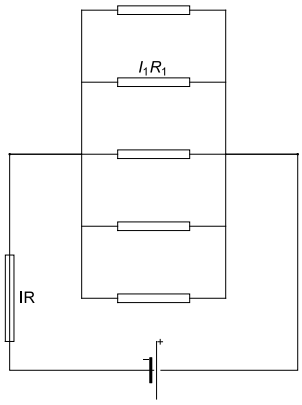
2. find

   (a) current I

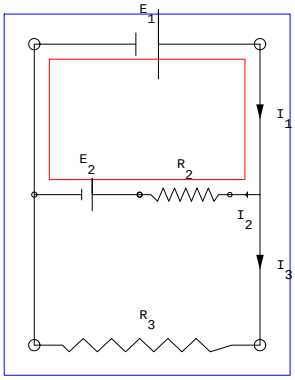
   (b) power released by each battery (watch for sign !)



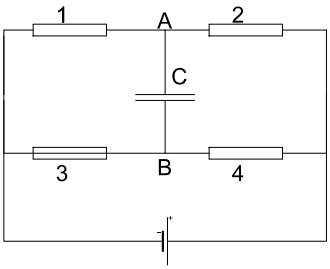
3. for $E = 10\,V$, $I_1 = 1\,A$, $R_1 = R = 2\,\Omega$ find I



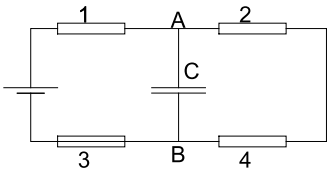
4. for $E_1 = 1\,V$, $E_2 = 2\,V$, $R_2 = R_3 = 2\,\Omega$ find all currents



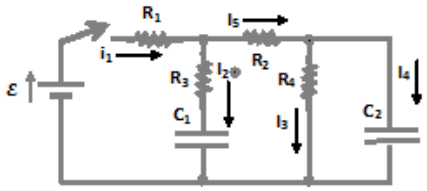
5. for $E = 12\,,V$, $C = 1\,\mu F$ and indicated R's (in Ohms) find
   (a) all currents at $t = 0^+$
   (b) all currents at $t \to \infty$
   (c) V_C and Q_C at $t \to \infty$



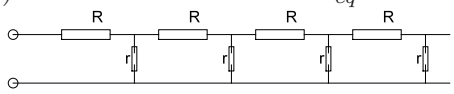
6. for $E = 12\,,V$, $C = 1\,\mu F$ and indicated R's (in Ohms) find
   (a) all currents at $t = 0^+$
   (b) all currents at $t \to \infty$
   (c) V_C and Q_C at $t \to \infty$



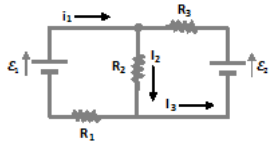
7. for $E = 12\,,V$, $C_1 = C_2 = 1\,\mu F$ and all R's $= 1$ Ohm find
   (a) currents in R_4 at $t = 0^+$ and $t \to \infty$
   (b) V_{C_2} and Q_{C_2} at $t \to \infty$



8. (*) for $R = r = 1\,\Omega$ find R_{eq} for an infinite chain



9. (*) Let $E_1 = E_2 = 1\,V, R_1 = R_3 = 3\,\Omega$ and $R_2 = 1\,\Omega$; find the current in resistor R_1.



10. A $4\,\mu F$ capacitor is discharged through a $4\,k\Omega$ resistor.
    (a) How long does it take for the capacitor to lose half of its initial charge?
    (b) how long does it take for the capacitor to lose half of its initial energy?