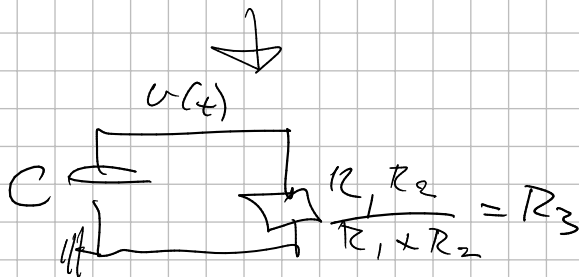
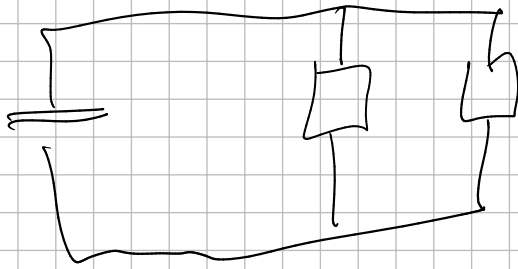


Oppg 1)

a)



$$C \frac{d}{dt} v(t) = v(t) \cdot \frac{1}{R_3}$$

$$\frac{d}{dt} v(t) - \frac{1}{R_3 C} v(t) = 0 \quad \tau = \frac{1}{R_3 C}$$

b) $i(t) > 0$

$$\frac{d}{dt} v + \lambda v = 0$$

$$\frac{d}{dt} (v e^{\lambda t}) = 0 \quad | \cdot \int dt$$

$$v e^{\lambda t} = C$$

$$v = C e^{-\lambda t}$$

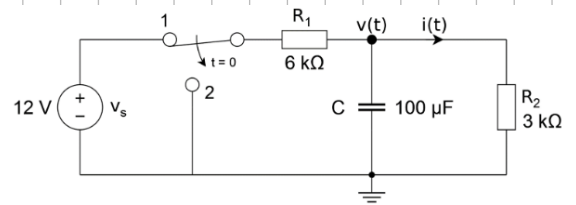
$$v = C e^{\frac{1}{R_3 C} t}$$

$$v(0) = V_s$$

$$C = V_s$$

$$v(t) = V_s e^{\frac{1}{R_3 C} t}$$

$$i(t) = v'(t) = R_3 V_s e^{\frac{1}{R_3 C} t}$$



Figur 1

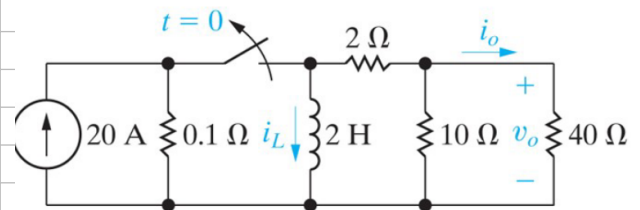
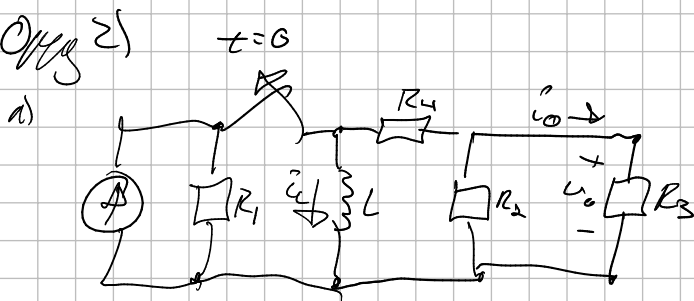
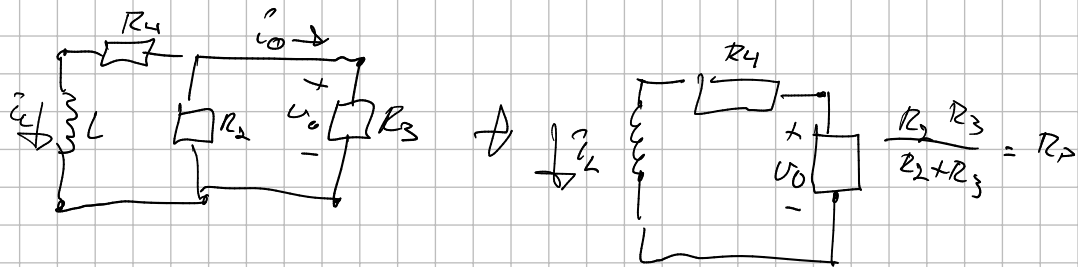


Figure 2



$$i_L(0) = I_0 = 20 \text{ A}$$

b)

$$i_L(\infty) = 0$$

c)

$$\tau = \frac{L}{R} = \frac{2}{10} = 0,2 \text{ s} = \frac{1}{5}$$

$$R = \left(2 + \frac{40 \cdot 10}{40 + 10} \right) = 10$$

d)

$$i(t) = 0 + (20) e^{-5t}$$

$$= 20 e^{-5t}$$

e)

$$-i_o = i(t) \frac{R_2}{R_2 + R_3}$$

$$i_o = -i(t) \frac{R_2}{R_2 + R_3} = -i(t) \frac{10}{50}$$

$$i_o(t) = -\frac{1}{5} i(t)$$

A)

$$P = U I \quad U = R I$$

$$P = I^2 R$$

$$i(t)^2 R = (20 e^{-5t})^2 \cdot 10$$

$$E(t) = \int (20 e^{-5t})^2 \cdot 10 dt = \int 4000 e^{-10t} \cdot 10 dt = 40000 \int_0^{\infty} e^{-10t} dt$$

$$= 40000 \cdot \left[-\frac{1}{10} e^{-10t} \right]_0^{\infty} = 0 - 40000 \cdot \left(-\frac{1}{10} \right) = \underline{\underline{4000 \text{ J}}}$$

$$g) E(t) = \frac{1}{2} \cdot 400$$

$$4000 \int_0^{\tau} e^{-10s} ds = 200$$

$$\int_0^{\tau} e^{-10s} ds = \frac{1}{20}$$

$$\int -\frac{1}{10} e^{-10s} \Big|_0^{\tau} = \frac{1}{20}$$

$$-\frac{1}{10} e^{-10\tau} + \frac{1}{10} = \frac{1}{20}$$

$$-e^{-10\tau} + 1 = \frac{1}{2}$$

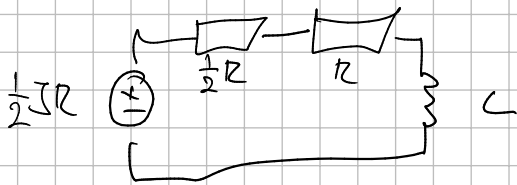
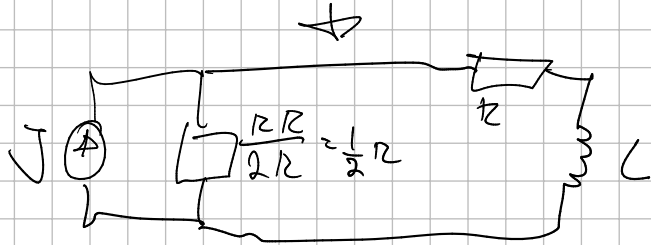
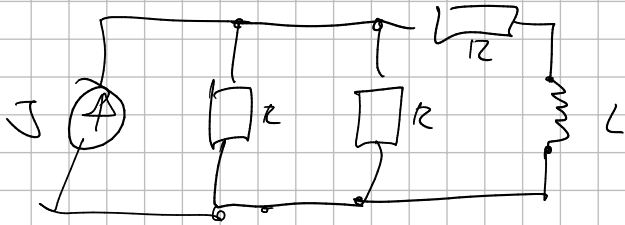
$$e^{-10\tau} = 1 - \frac{1}{2}$$

$$-10\tau = \ln\left(\frac{1}{2}\right)$$

$$\tau = -\frac{1}{10} \ln\left(\frac{1}{2}\right)$$

$$\tau = \underline{\underline{0,0693}}$$

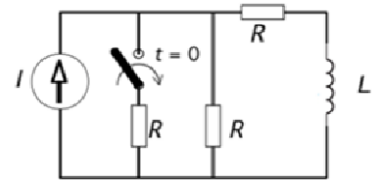
Opplg 3)



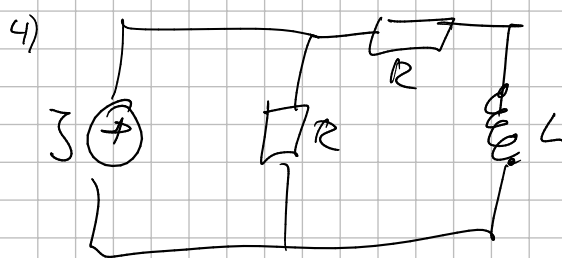
$$R_T = \frac{3}{2}R$$

$$\tau = \frac{L}{R} = \frac{2}{3} \cdot \frac{L}{R}$$

G gygpi



Figur 3



$$i(t) = J(1 - e^{-\frac{3L}{2R}t})$$



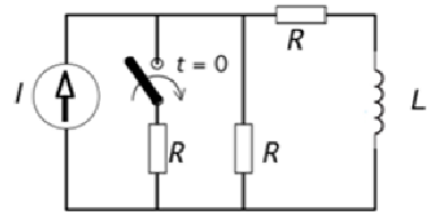
$$\tau = \frac{L}{2R}$$

$$\begin{aligned} W &= \int J^2 2R dt \\ &= 2R \int J^2 dt \\ &= 2R J^2 t \end{aligned}$$

$$\begin{aligned} W_1 &= \int i(t)^2 \frac{3}{2}R \\ &= \frac{3}{2}R \int i(t)^2 dt \end{aligned}$$

$$= \frac{3}{2}R \cdot \int J$$

C



Figur 3

Ques
6

