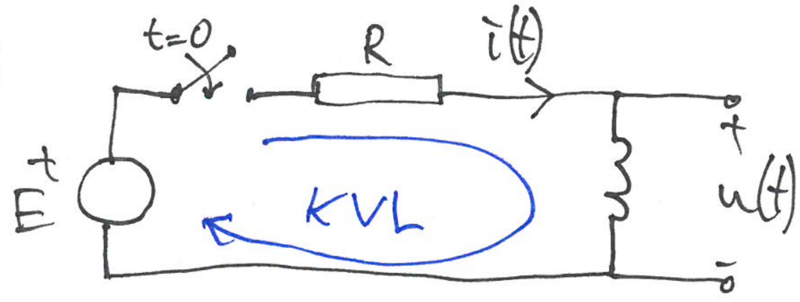
B-15)



KVL: (~~for~~ $t>0$)

$$E - R\cdot i(t) - u(t) = 0$$

För spolen gäller:

$$u(t) = L\cdot \frac{\partial i(t)}{\delta t}$$

$\Rightarrow$

$$R\cdot i(t) + L\cdot \frac{\partial i(t)}{\partial t} = E$$

Låt oss ansätta $i(t) = \alpha\cdot e^{\beta t} + \gamma$

$$R\cdot \alpha\cdot e^{\beta t} + L\cdot \alpha\cdot \beta\cdot e^{\beta t} + R\cdot \gamma = E$$

$$\Rightarrow \gamma = \frac{E}{R}, \quad \beta = -R/L$$

$$\Rightarrow i(t) = \alpha\cdot e^{-\frac{R\cdot t}{L}} + E/R$$

$$i(0+) = 0\,A \Rightarrow \alpha = -E/R$$

$$\Rightarrow i(t) = E/R\left(1 - e^{-\frac{R\cdot t}{L}}\right)$$

$$u(t) = L\cdot \frac{\delta i(t)}{\delta t} = \cancel{L}\cdot \frac{E}{R}\cdot \frac{-R}{\cancel{L}}\cdot -e^{-\frac{R\cdot t}{L}} = E\cdot e^{-\frac{R\cdot t}{L}}$$

$$\boxed{\begin{aligned} i(t) &= \frac{E}{R}\left(1 - e^{-\frac{R\cdot t}{L}}\right) \\ u(t) &= E\, e^{-\frac{R\cdot t}{L}} \end{aligned}}$$