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$$R\frac{dq}{dt} + \frac{1}{C}q = 0$$

$$Rq' + \frac{1}{C}q = 0$$

$$q' + \frac{1}{RC}\cdot q = 0$$

$$q(t) = Be^{-\frac{1}{RC}t} = B\cdot e^{-\frac{t}{RC}}$$

$$q(0) = Q \iff B\underbrace{e^{-\frac{0}{RC}}}_{1} = Q \qquad B = Q$$

$$q(t) = Q\cdot e^{-\frac{t}{RC}}$$

4228 $L\frac{dI}{dt} + RI = U$

$L I'(t) + R I(t) = U$

$I'(t) + \frac{R}{L} I(t) = \frac{U}{L}$ *

Partikulärlösning $I_p = C \Rightarrow I_p' = 0$ ins. i *

VL: $0 + \frac{R}{L} \cdot C$

HL: $\frac{U}{L}$ $\quad VL = HL \Rightarrow \frac{R}{L} C = \frac{U}{L}$

$C = \frac{U}{L} \cdot \frac{L}{R} = \frac{U}{R}$

$\Rightarrow I_p = \frac{U}{R}$

Homogenlösning $I_h = D e^{-\frac{R}{L}t}$

Allm. lösn. $I(t) = I_h + I_p = D e^{-\frac{R}{L}t} + \frac{U}{R}$

b) Begynnelsevillkor $I(0) = 0 \Rightarrow D \underbrace{e^{-\frac{R}{L}\cdot 0}}_{1} + \frac{U}{R} = 0 \Rightarrow D = -\frac{U}{R}$

$I(t) = -\frac{U}{R} e^{-\frac{R}{L}t} + \frac{U}{R} = \frac{U}{R}\left(1 - e^{-\frac{R}{L}t}\right)$

c) $I(t) = 0{,}98 \cdot \frac{U}{R} \Rightarrow \frac{U}{R}\left(1 - e^{-\frac{R}{L}t}\right) = 0{,}98 \cdot \frac{U}{R} \Leftrightarrow$

$1 - e^{-\frac{R}{L}t} = 0{,}98 \quad e^{-\frac{R}{L}\cdot t} = 0{,}02$

$-\frac{R}{L} t = \ln 0{,}02 \quad t = -\frac{L}{R} \ln 0{,}02 = \left[\begin{matrix} L = 45\,kH \\ R = 12\,k\Omega \end{matrix}\right] =$

$-\frac{45}{12} \ln 0{,}02 \approx 14{,}7$ 14,7 sek.