(13.18) . a) relation 13.9 : $i(t) = \frac{U}{R} e^{-\frac{1}{\tau}t}$ (Courant de charge)

On part de $u(t) = U\left(1 - e^{-\frac{1}{\tau}t}\right)$

Sachant que $i(t) = C\frac{d}{dt}u(t) = C\frac{d}{dt}\left(U\left(1-e^{-\frac{t}{\tau}}\right)\right) = CU\frac{d}{dt}\left(1-e^{-\frac{t}{\tau}}\right) = CU\frac{1}{\tau}e^{-\frac{t}{\tau}}$

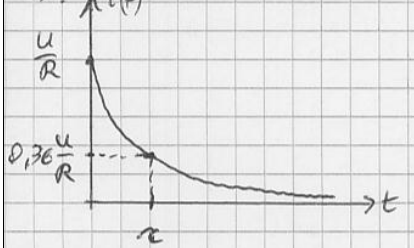
$= \cancel{C}U\frac{1}{R\cancel{C}}e^{-t/\tau} = \underline{\frac{U}{R}e^{-t/\tau}}$

b). relation 13.11. $i(t) = \frac{U}{R}e^{-\frac{1}{\tau}t}$ (Courant de décharge)

On part de $u(t) = Ue^{-t/\tau}$

Comme $i(t) = C\frac{d}{dt}u(t) = CU\frac{d}{dt}e^{-t/\tau} = CU\left(-\frac{1}{\tau}\right)e^{-t/\tau} = \underline{\underline{-\frac{U}{R}e^{-\frac{1}{\tau}t}}}$

le courant de décharge a une direction opposée au courant de charge.

c). 

$i(\tau) \cong 0{,}36\frac{U}{R}$

(13.21) . a). relation à démontrer : $u(t) = Ue^{-\frac{1}{\tau}t}$ $\quad \tau = \frac{L}{R}$

On part de la relation 13.14 : $i(t) = \frac{U}{R}\left(1 - e^{-\frac{1}{\tau}t}\right)$

Pour la charge de la bobine, on a $u(t) = L\frac{di}{dt}$

$\Rightarrow \frac{di}{dt} = -\frac{U}{R}\cdot\left(-\frac{1}{\tau}\right)e^{-\frac{1}{\tau}t}$

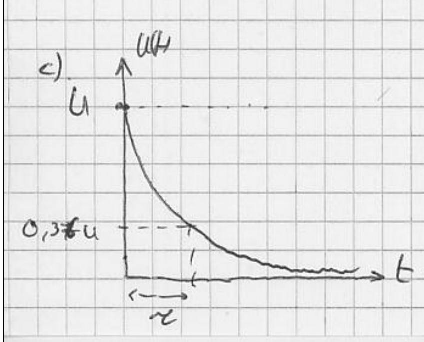
$\Rightarrow \quad u(t) = +\cancel{L}\frac{U}{R}\cdot\frac{R}{\cancel{L}}e^{-\frac{1}{\tau}t} = \underline{\underline{Ue^{-\frac{1}{\tau}t}}}$

b). relation à démontrer : $u(t) = Ue^{-t/\tau}$

On part de la relation 13.14 : $i(t) = \frac{U}{R}e^{-\frac{1}{\tau}t}$

$\Rightarrow \frac{di}{dt} = -\frac{R}{L}\frac{U}{R}e^{-\frac{1}{\tau}t} = -\frac{U}{L}e^{-\frac{1}{\tau}t}$ $\quad\Rightarrow u(t) = L\frac{di}{dt} = \underline{\underline{-Ue^{-\frac{1}{\tau}t}}}$

lors de la décharge, la tension est opposée à la tension lors de la charge

c). 

$u(\tau) = 0{,}36\,U$