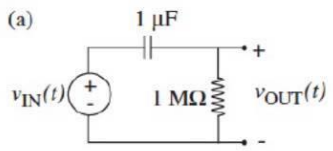
Hw 3 - 6 (a)



from Q4 $V_{in} = 10 \cdot u(t)$

step response : $V_{L,step} = 10\,u(t) - 10\,u(t)\,e^{-t} \quad (t > 0)$

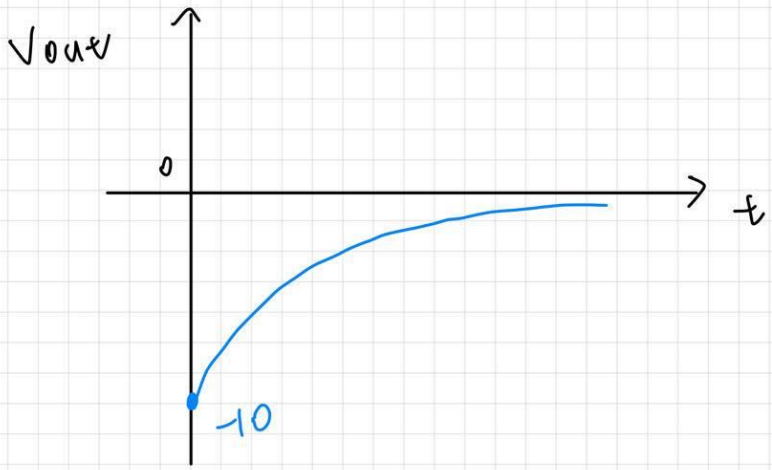
$\Rightarrow V_{out,step}(t) = 10\,u(t)\,e^{-t}$

$= 10\,e^{-t}$ for $t > 0$

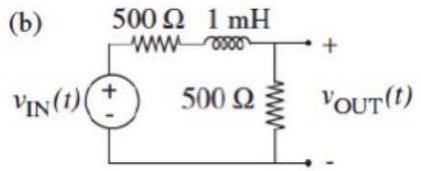
$\Rightarrow$ impulse input : $V_{in} = 10 \cdot \delta(t)$

$\Rightarrow V_{out,imp}(t) = \dfrac{d(V_{out,step})}{dt}$ for $t > 0$

$= -10\,e^{-t}$ (V) for $t > 0$ #



HW3 - 6 (b)



from Q4 $V_{in}'(t) = 10\,u(t)$

step response : $i_{L,step}(t) = \frac{1}{100}u(t) - \frac{1}{100}u(t)\,e^{-10^6 t}$

→ impulse input : $V_{in,imp}(t) = 10\cdot\delta(t)$

→ $V_{out,step}(t) = i_{L,step}(t)\cdot 500$

$= 5\,u(t) - 5\,u(t)\,e^{-10^6 t}$ $(t>0)$

⇒ $V_{out,imp}(t) = \frac{d(V_{out,step})}{dt}$

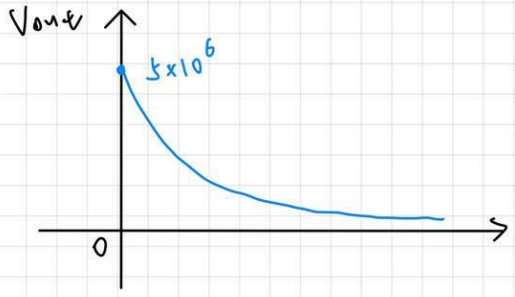
$= 5\,\delta(t) - 5\,(\delta(t)\,e^{-10^6 t} + u(t)(-10^6)\,e^{-10^6 t})$

$= \underbrace{5\,\delta(t)(1 - e^{-10^6 t})}_{=0 \text{ at } t=0} + 5\cdot 10^6\,u(t)\,e^{-10^6 t}$

$= 5\cdot 10^6\,u(t)\,e^{-10^6 t}$

$= 5\cdot 10^6\,e^{-10^6 t}$ (V)

for $t > 0$



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