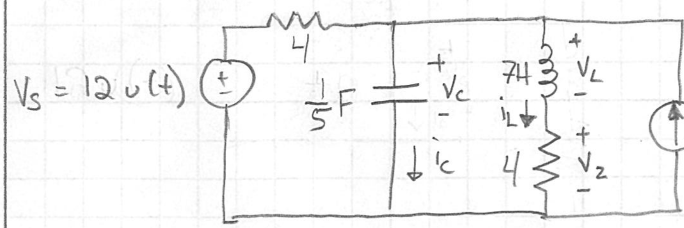
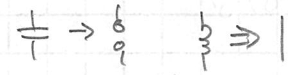
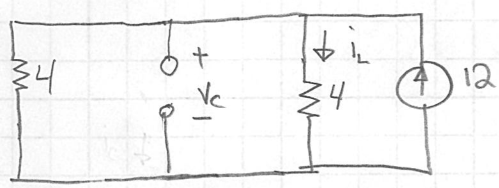


Find

$V_c(0^+)$	$V_c'(0^+)$
$i_L(0^+)$	$i_L'(0^+)$
$V_2(0^+)$	$V_2'(0^+)$
$V_L(0^+)$	$V_L'(0^+)$

① Draw $t<0$, find I_L, V_c always.

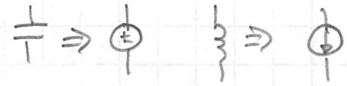


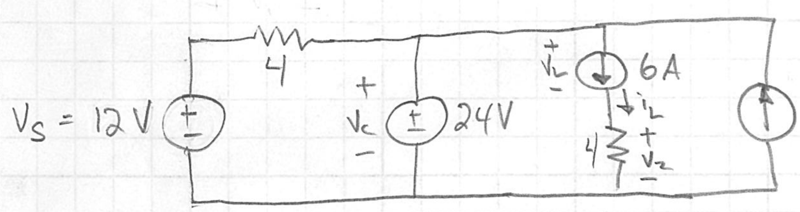


$i_L = 12 \frac{4}{4+4} = 6A$ i divider

$V_c = 4 \cdot i_L = 24V$ Ω's Law

② Draw $t=0^+$, find whatever asked to find.





$V_c(0^+) = 24V$ by inspection – directly across a voltage source

$i_L(0^+) = 6A$ by inspection – directly through a current source

$V_2(0^+) = (6A)(4\Omega) = 24V$ by Ω's Law

$V_c'(0^+)$: $i_c = CV_c' \Rightarrow V_c' = \frac{1}{C} i_c$
$= (5)(3)$
$= 15V/s$

To find i_c: KCL top right:
$\frac{24-12}{4} + i_c + 6 - 12 \Rightarrow i_c = 3A$

$i_L'(0^+)$: $V_L = Li_L' \Rightarrow i_L' = \frac{1}{L} V_L$
$= \frac{1}{7}(0)$
$= 0A/s$

To find V_L: KVL middle loop:
$24 - V_2 - V_L = 0 \Rightarrow V_L = 0V$ since $V_2 = 24$ above

$V_2'(0^+)$: $V_2 = i_L \cdot 4$ Ω's Law and $i_L = i_4$
$V_2' = i_L' \cdot 4$ take deriv. both sides
$= 0 \cdot 4$ i_L' found above
$= 0V/s$

$V_L'(0^+)$: KVL middle loop: $V_c - V_2 - V_L = 0$
$V_L = V_c - V_2$ Solve for V_L
$V_L' = V_c' - V_2'$ Take deriv of eqn
$= 15 - 0$ V_c', V_2' found above
$= 15V/s$

Summary

$V_c(0^+) = 24V$	$V_c'(0^+) = 15V/s$
$i_L(0^+) = 6A$	$i_L'(0^+) = 0A/s$
$V_2(0^+) = 24V$	$V_2'(0^+) = 0V/s$
$V_L(0^+) = 0V$	$V_L'(0^+) = 15V/s$