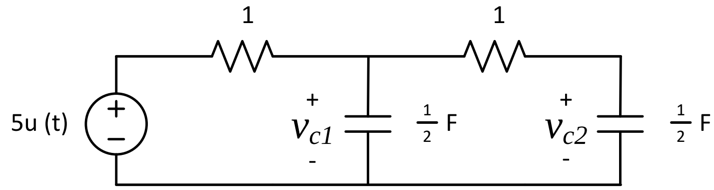
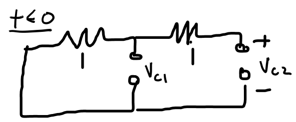
1. Find: $v_{c1}(0^+)$ $v_{c2}(0^+)$
$v_{c1}'(0^+)$ $v_{c2}'(0^+)$
$v_{c1}(\infty)$ $v_{c2}(\infty)$

Hints: • All answers 0, 5, 10
• Get units right

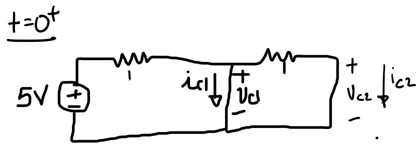


$t<0$



By inspection $v_{C1}=0$, $v_{C2}=0$ ← Solve for all v_c's, all i_L's, regardless of what is asked for

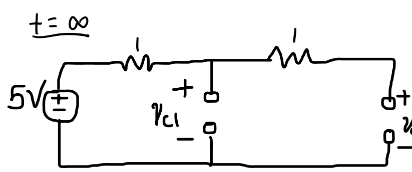
$t=0^+$



$i_{C1}=C_1 v_{C1}' \Rightarrow v_{C1}' = \frac{1}{C_1} i_{C1} = (2F)(5A) = 10\ V/s$

$i_{C2}=C_2 v_{C2}' \Rightarrow v_{C2}' = \frac{1}{C_2} i_{C2} = 2\ (0) = 0\ V/s$

$t=\infty$

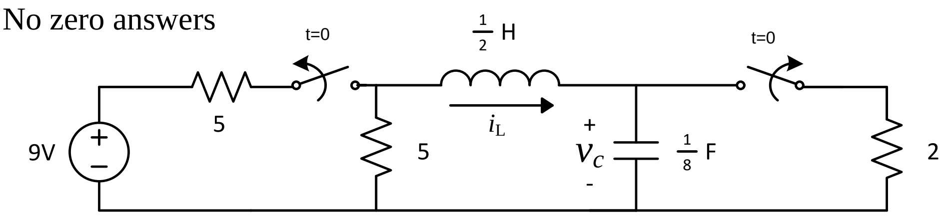


no current flows ⇒ no voltage drop across R's ⇒ $v_{C1}(\infty)=v_{C2}(\infty)=5V$

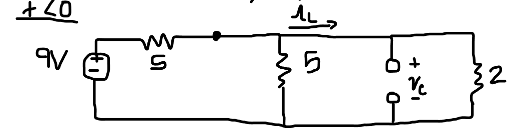
Summary
$v_{C1}(0^+) = 0\ V$
$v_{C1}'(0^+) = 10\ V/s$
$v_{C1}(\infty) = 5\ V$
$v_{C2}(0^+) = 0\ V$
$v_{C2}'(0^+) = 0\ V/s$
$v_{C2}(\infty) = 5\ V$

2. Find: $v_c(0^+)$ $i_L(0^+)$
$v_c'(0^+)$ $i_L'(0^+)$

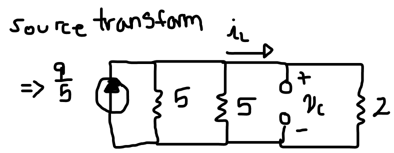
Hints: • All answers are "nice" numbers (integers between -20 and 20)
• No zero answers



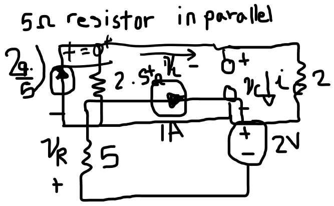
find $v(0^+)$ and $v'(0^+)$
$t<0$



source transform



5Ω resistor in parallel



Current Divider
$i_C = \frac{9}{5} \cdot \frac{2.5}{2.5+2} = i_L = 1A$
$v_C' = \frac{1}{C} i_C = (8)(1) = 8\ V/s$

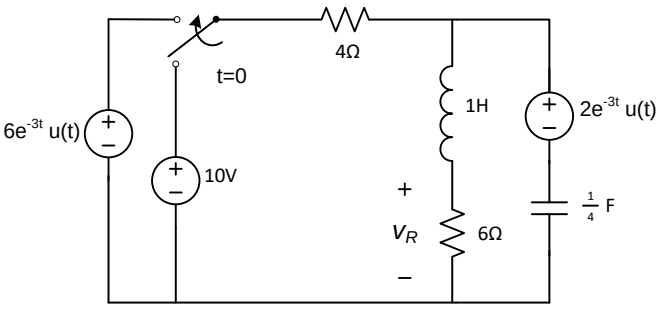
v_L across 2.5Ω resistor: $v_L + 2 + (1A)(5\Omega) = 0 \Rightarrow v_L = -7V$

$i_L' = \frac{1}{L} v_L$
$i_L' = (2)(-7) = -14\ A/s$

Summary

$i_L(0^+) = 1A$	$v_C(0^+) = 2V$
$i_L'(0^+) = -14\ A/s$	$v_C'(0^+) = 8\ V/s$

3. Find: $v_R(0^+)$
$v_R'(0^+)$
$v_R(\infty)$



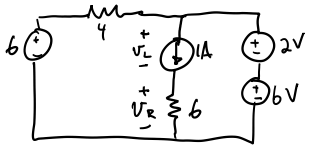
Hints:
- to find v_R', think about how it relates to i_R' and how that relates to i_L'
- make sure you evaluate the sources at t = 0 or t = ∞
- All answers are integers between 0 and 40

$t<0$ Find $v_c(0^-)$, $i_L(0^-)$

$i_L = \frac{10V}{4+6} = \boxed{1A}$

$v_c = 6 \cdot i_L = \boxed{6V}$

$t=0^+$ Find v_R, v_R'



$v_R = (1A)(6\Omega) = 6V \Rightarrow \boxed{v_R = 6V}$

to find v_R', note we can find i_L' $(= \frac{1}{L} v_L)$, then since $i_L = i_R$, $i_L' = i_R'$, and since $v_R = i_R R$ then $v_R' = i_R' R$. Armed with this plan,

v_L: KVL: $+6 - v_R - v_L + 2 = 0$, but $v_R = 6$ so $v_L = 2V$

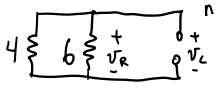
$i_L' = \frac{1}{L} v_L = \frac{1}{L} \cdot 2 = 2\ A/s$

$i_R' = i_L' = 2\ A/s$

$v_R' = i_R' R = 2 \cdot 6 = 12\ V/s$

$\boxed{v_R' = 12\ V/s}$

$t=\infty$



no source $\Rightarrow \boxed{v_R = 0V}$

In summary,

$v_R(0^+) = 6V$

$v_R'(0^+) = 12\ V/s$

$v_R(\infty) = 0V$