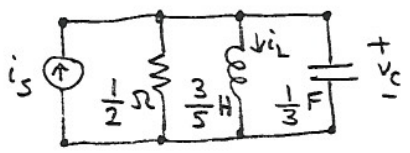
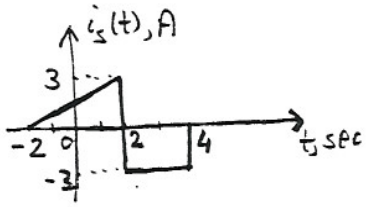
EE 201 / ZPS VII

1)



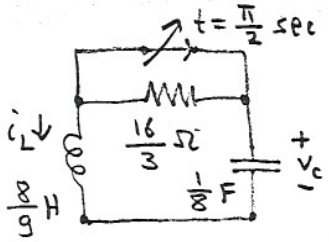
$v_c(-3)=4$ V, $i_L(-3)=2$ A



(a) Find and sketch $v_c(t)$ and $i_L(t)$ for $t \geq -3$ sec.

(b) State and solve the dual problem.

2)



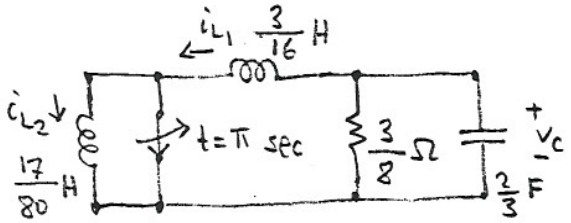
$v_c(0)=-6$V

$i_L(0)=3$A

(a) Find and sketch $v_c(t)$ and $i_L(t)$ for $t \geq 0$.

(b) State and solve the dual problem.

3)

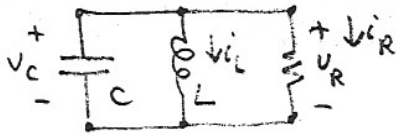


$v_c(0)=5$V, $i_{L_1}(0)=3$A, $i_{L_2}(0)=-7$A

(a) Find and sketch $v_c(t)$, $i_{L_1}(t)$ and $i_{L_2}(t)$ for $t \geq 0$.

(b) State and solve the dual problem.

4)

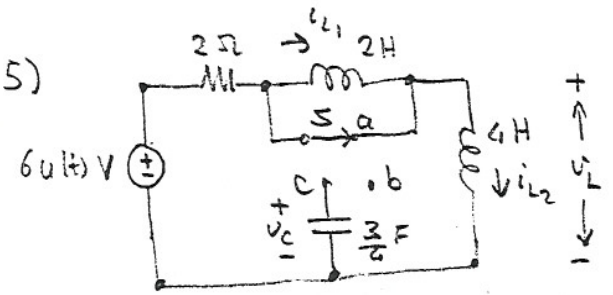


$i_R = \frac{1}{3}v_R^3 - v_R$

$v_c(0)=V_0$, $i_L(0)=I_0$

obtain the differential equations satisfied by $v_c(t)$ and $i_L(t)$.

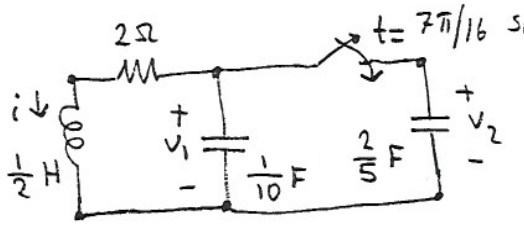
5)



$i_{L_1}(0^-)=6$ A, $i_{L_2}(0^-)=-5$A, $v_c(0^-)=2$V

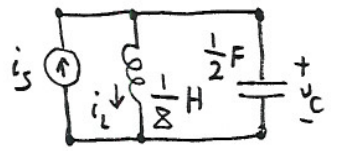
The switch S is at position "a" at $t=0^-$. It is thrown to position "b" at $t=\ln 4$ sec and then to position "c" at $t=\ln 32$ sec. Find $i_{L_1}(t)$, $i_{L_2}(t)$ and $v_L(t)$ for $t \geq 0$.

6)



$i(0)=3$A, $v_1(0)=5$V, $v_2(0)=0$

Find and sketch $i(t)$ and $v_1(t)$ for $t \geq 0$.

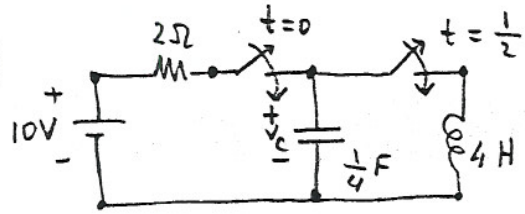
7) 

$v_c(0^-) = 5V$, $i_L(0^-) = -8A$

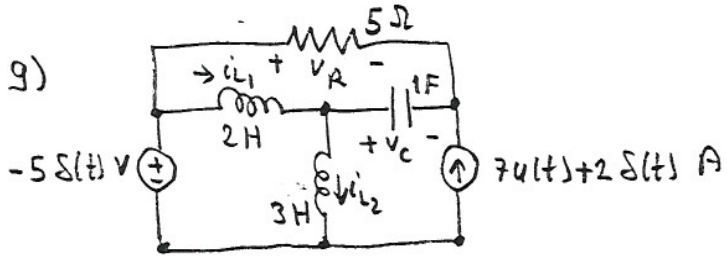
Find $v_c(t)$ and $i_L(t)$ for $t \geq 0$ when

(a) $i_s(t) = 10\cos(3t)$ A,

(b) $i_s(t) = 10\cos(4t)$ A.

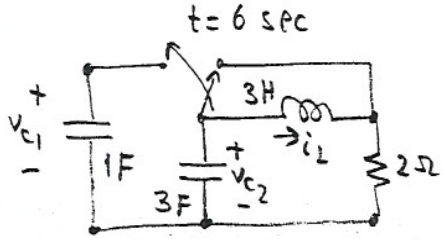
8) 

$v_c(0^-) = 5V$ Find $v_c(t)$ for $t \geq 0$.

9) 

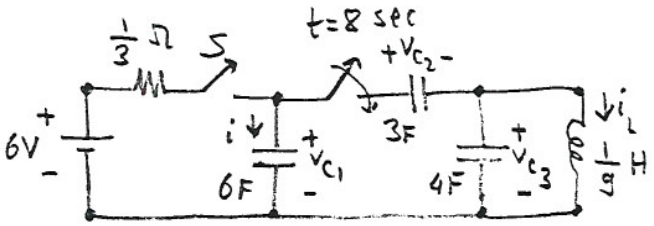
$v_c(0^-) = 6$ V, $i_{L_1}(0^-) = 8$ A, $i_{L_2}(0^-) = 2$ A

Find $v_R(t)$ for $t \geq 0$.

10) 

$v_{c_1}(0) = 18$ V, $v_{c_2}(0) = -10e$ V, $i_L(0) = -2$ A

Find $v_{c_2}(t)$ for $t \geq 0$.

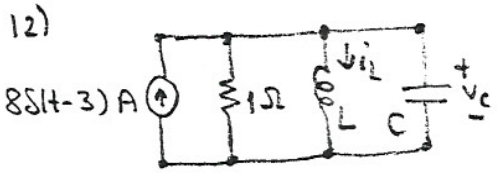
11) 

$v_{c_1}(0^-) = -1$ V, $v_{c_2}(0^-) = 2$ V, $v_{c_3}(0^-) = 2$ V

$i_L(0^-) = 0$

The switch S closes at $t = 1$ sec and reopens at $t = 7$ sec.

Find and sketch $i_L(t)$, $i(t)$ and $v_{c_1}(t)$ for $t \geq 0$.

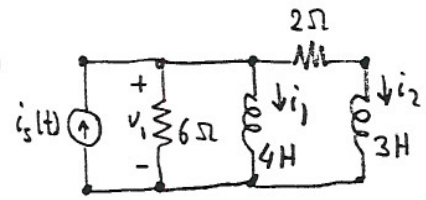
12) 

$i_L(0) = 0$, $v_c(0) = 0$

$v_c(3^+) = 1$ V and the response is critically damped.

(a) Determine L and C.

(b) Find $v_c(t)$ for $t \geq 0$.

13) 

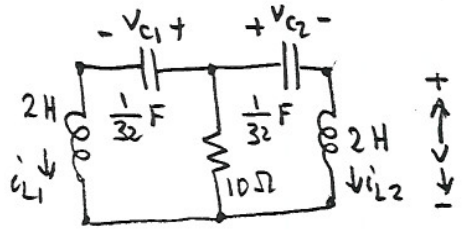
$i_1(0^-) = 1$ A, $i_2(0^-) = 2$ A

Determine $v_1(0^+)$ and $v_1(\infty)$ if

(a) $i_s(t) = \delta(t)$,

(b) $i_s(t) = u(t)$.

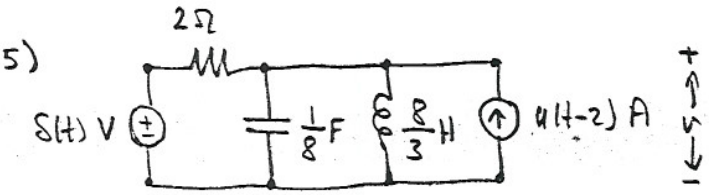
(c) Obtain the differential equation satisfied by $i_2(t)$.

14) 

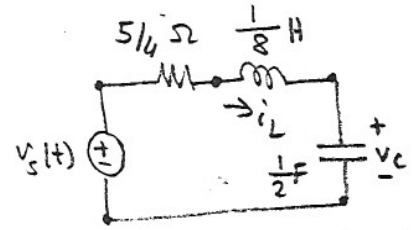
(a) Find $v(t)$ for $t \geq 0$ given

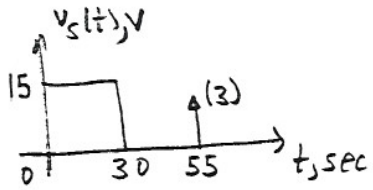
(a) $v_{C_1}(0) = v_{C_2}(0) = 10$ V, $i_{L_1}(0) = i_{L_2}(0) = 2$ A

(b) $v_{C_1}(0) = v_{C_2}(0) = 10$ V, $i_{L_1}(0) = 2$ A, $i_{L_2}(0) = 4$ A.

15) 

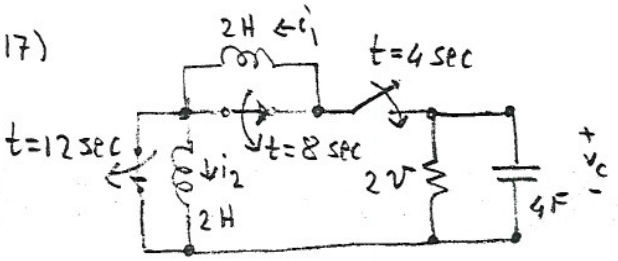
Find the zero-state response for $v(t)$, $t > 0$.

16) 



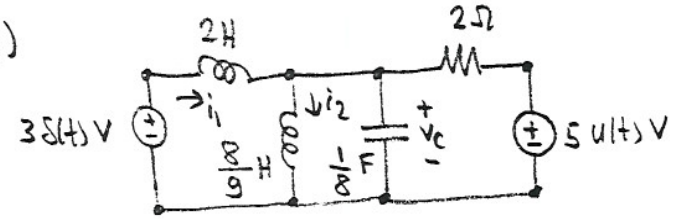
Find and sketch $v_c(t)$ for $t \geq 0$.

$v_c(0^-) = -3$ V, $i_L(0^-) = 0$

17) 

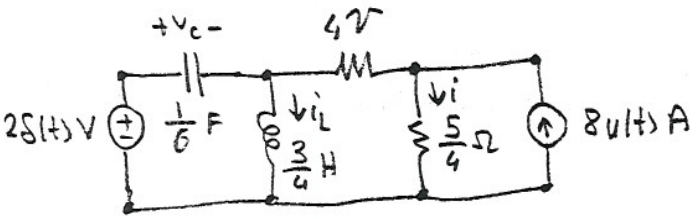
$i_1(0) = 1$A, $i_2(0) = -2$ A, $v_c(0) = 5$ V

Find and sketch $v_c(t)$ for $t \geq 0$.

18) 

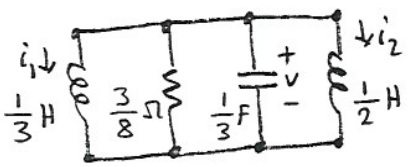
$i_1(0^-) = -4$ A, $i_2(0^-) = 3$ A, $v_c(0^-) = 2$ V

Find $i_1(t)$ for $t > 0^-$.

19) 

$v_c(0^-) = -3$ V, $i_L(0^-) = 2$ A

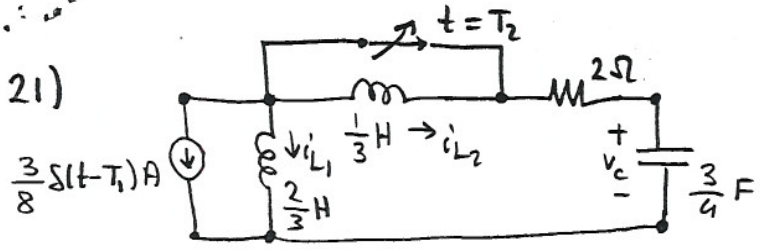
Find and sketch $i(t)$ for $t \geq 0^-$.

20) 

$v(0) = 3$V, $i_1(0) = 5$ A, $i_2(0) = -8$ A.

Find $i_1(t)$ for $t > 0$.

21)

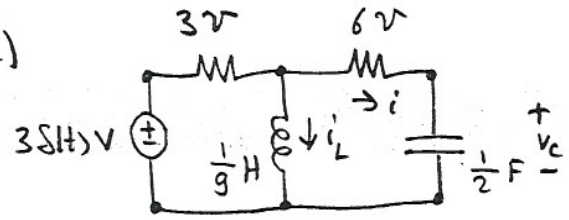


$T_1 = \ln 2$ sec, $T_2 = 2\ln 2$ sec

$v_c(0) = 3$ V, $i_{L_1}(0) = 0$, $i_{L_2}(0) = \frac{3}{8}$ A

Find $v_c(t)$ for $t \geq 0$.

22)



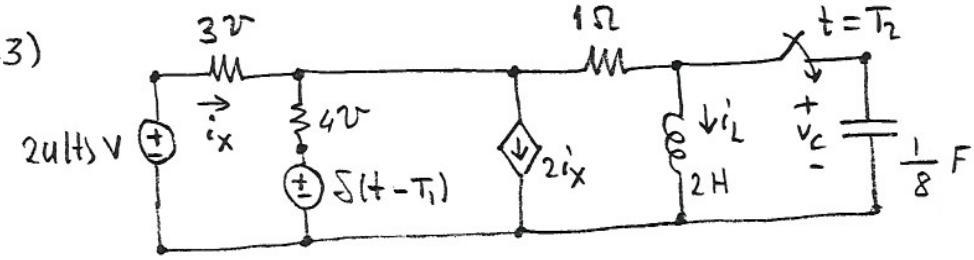
$v_c(0^-) = 2$ V, $i_L(0^-) = -4$ A

(a) Find $v_c(0^+)$ and $i_L(0^+)$.

(b) Obtain the differential equation satisfied by $v_c(t)$. Solve this equation and find $v_c(t)$ for $t > 0$.

(c) Find $i(t)$ for $t > 0^-$.

23)

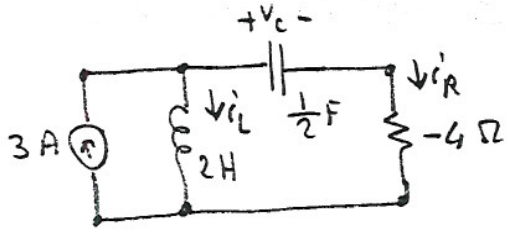


$T_1 = \ln 4$ sec, $T_2 = \ln 12$ sec

$i_L(0^-) = 1$ A, $v_c(0^-) = 10$ V

Find and sketch $i_L(t)$ for $t > 0$.

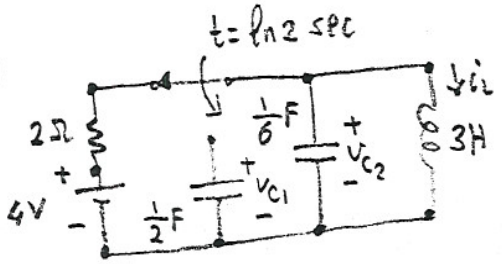
24)



$i_L(0) = 5$ A, $v_c(0) = 4$ V

Find $i_R(t)$ for $t \geq 0$.

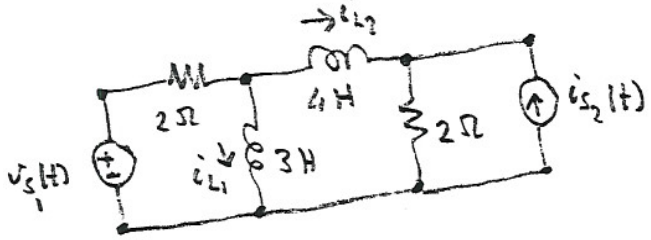
25)



$v_{C_1}(0) = 2$ V, $v_{C_2}(0) = 2$ V, $i_L(0) = \frac{10}{3}$ A

Find and sketch $v_{C_2}(t)$ for $t \geq 0$.

26)



$i_{L_1}(0) = I_1$, $i_{L_2}(0) = I_2$

Obtain the differential equations satisfied by $i_{L_1}(t)$ and $i_{L_2}(t)$.