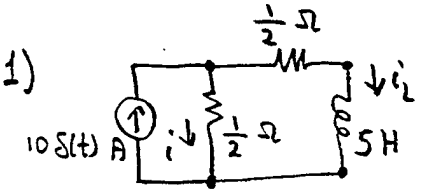
METU EEED

EE 201 / ZPS VI

Fall 2009

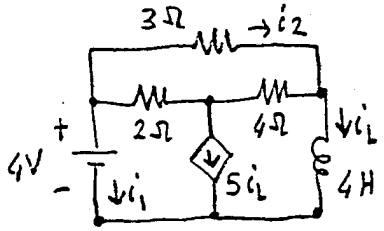
1)



$i_L(0^-) = -2$ A

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

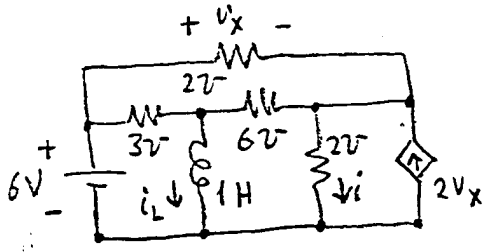
2)



$i_L(0) = 7$ A.

Find $i_1(t)$ and $i_2(t)$ for $t \geq 0$.

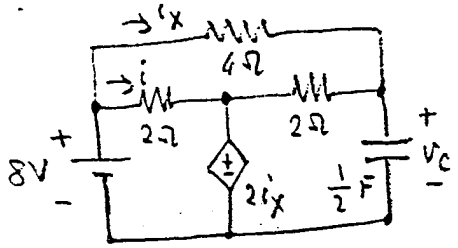
3)



$i_L(0) = 6$ A.

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

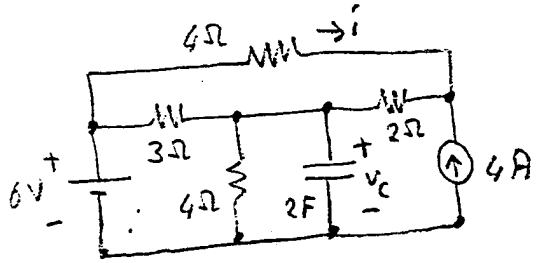
4)



$v_c(0) = 6$ V.

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

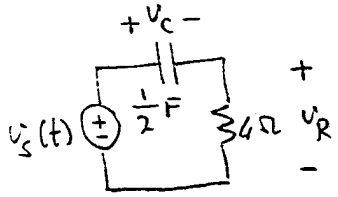
5)



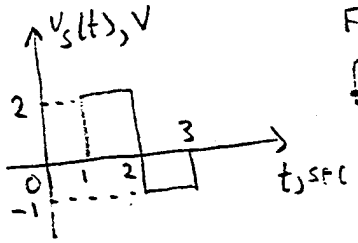
$v_c(0) = 7$ V.

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

6)

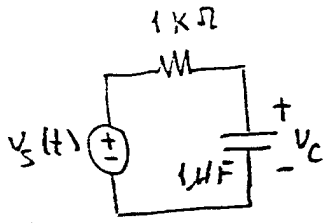


$v_c(0) = 0$

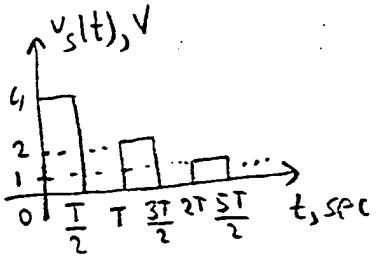


Find and sketch $v_R(t)$ for $t \geq 0$.

7)

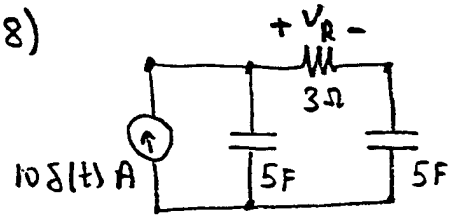


$v_c(0) = 5$V

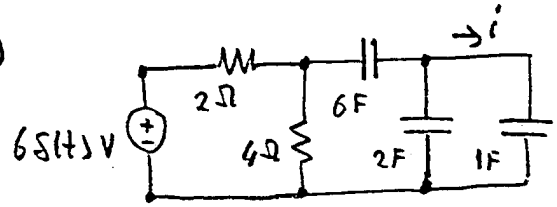


T = 2 msec.

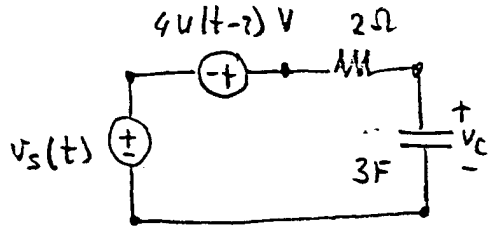
Find and sketch $v_c(t)$ for $t \geq 0$.

8) 

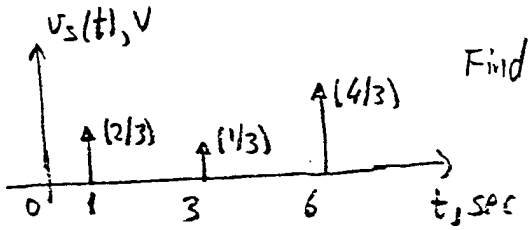
The capacitor voltages are zero at $t=0^-$.
Find and sketch $v_R(t)$ for $t>0^-$.

9) 

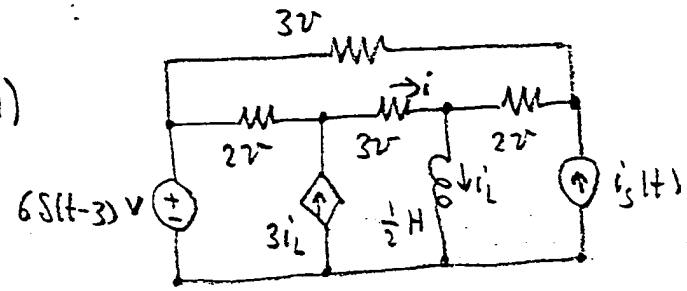
The capacitor voltages are zero at $t=0^-$.
Find $i(t)$ for $t>0^-$.

10) 

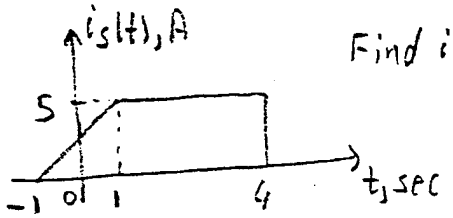
$v_c(0) = -3$ V



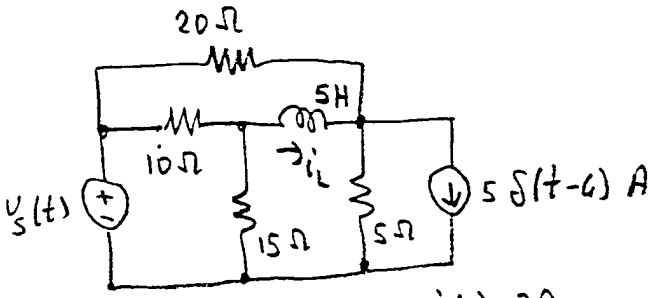
Find $v_c(t)$ for $t>0$.

11) 

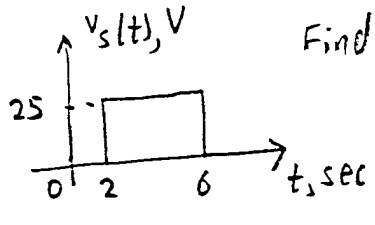
$i_L(-1^-) = -5$ A



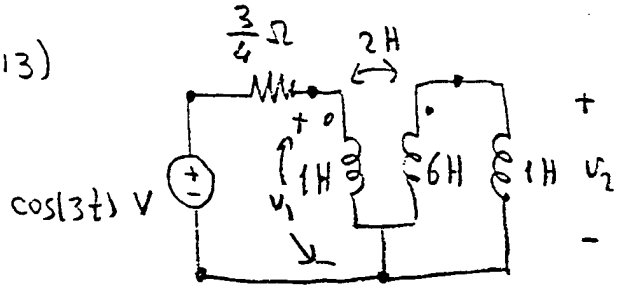
Find $i(t)$ for $t>-2$ sec.

12) 

$i_L(0) = 3$A

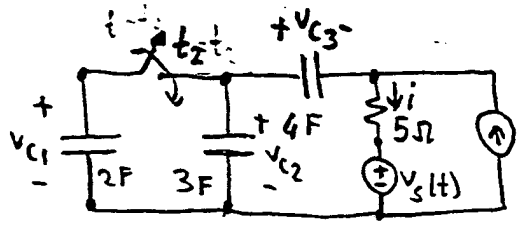


Find $i_L(t)$ for $t>0$.

13) 

Assume zero initial conditions (at $t=0$).
Find $v_1(t)$ and $v_2(t)$ for $t>0$.

14)



$v_s(t) = 6 + 4\,u(t-t_1)$ V

$v_{C_1}(0) = \frac{19}{28}$ V, $v_{C_2}(0) = -1$ V

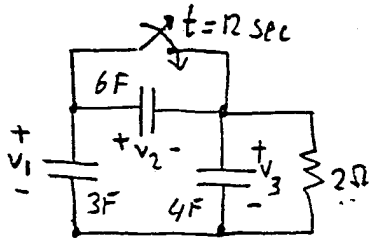
$v_{C_3}(0) = 3$ V

$t_1 = \frac{60}{7}\ln 2$ sec, $t_2 = 2t_1$, $t_3 = t_2 + \frac{100}{9}\ln 2$ sec

(a) Find and sketch $v_{C_1}(t)$, $v_{C_2}(t)$, $v_{C_3}(t)$ and $i(t)$ for $t>0$.

(b) State and solve the dual problem.

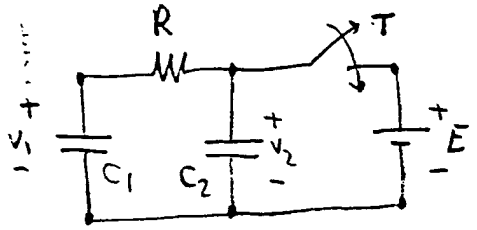
15)



$v_1(0) = 5$ V, $v_2(0) = 1$ V

Find and sketch $v_3(t)$ for $t>0$.

16)



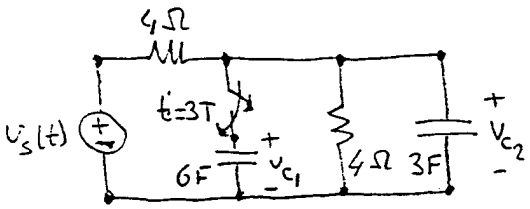
$T>0$, $v_1(0) = V_1$, $v_2(0) = V_2$.

Find $v_1(t)$ and $v_2(t)$ for $t>0$.

Compute the stored energies in the capacitors at $t=0$, $t=\infty$.

Compute the energy delivered to the resistor and the energy supplied by the source on $(0,\infty)$. Comment.

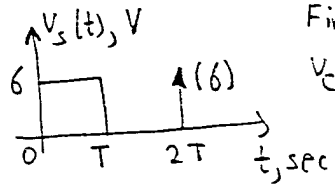
17)



$T = 6$ sec

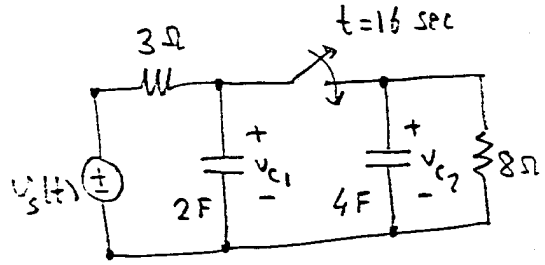
$v_{C_1}(0) = -2$ V

$v_{C_2}(0) = 7$ V



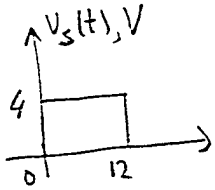
Find and sketch $v_{C_2}(t)$ for $t>0$.

18)



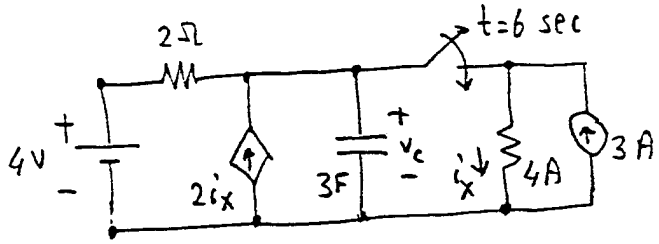
$v_{C_1}(0^-) = 2$ V

$v_{C_2}(0^-) = -8$ V



Find and sketch $v_{C_1}(t)$ for $t>0$.

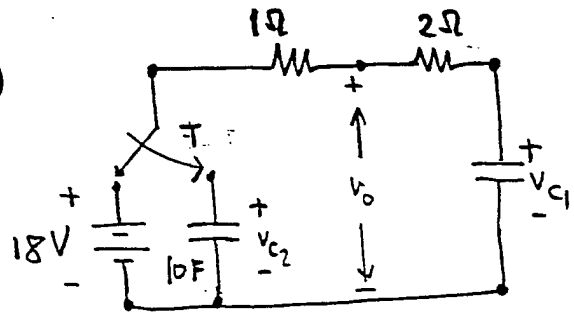
19)



$v_c(0) = 6$ V.

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

20)

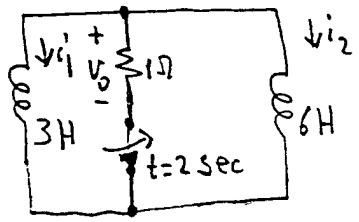


$T = 6 \ln 3$ sec

$v_{C_1}(0) = 9$ V, $v_{C_2}(0) = 6$ V.

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

21)

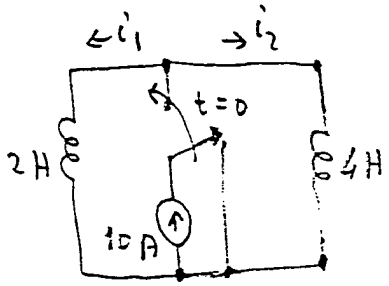


$i_1(0) = 5$A, $i_2(0) = -2$ A.

Find $v_o(t)$, $i_1(t)$ and $i_2(t)$ for $t \geq 0$.

Compute the stored energies in the inductors at $t = 0$ and $t = \infty$. Compute the energy delivered to the resistor on $[0, \infty)$.

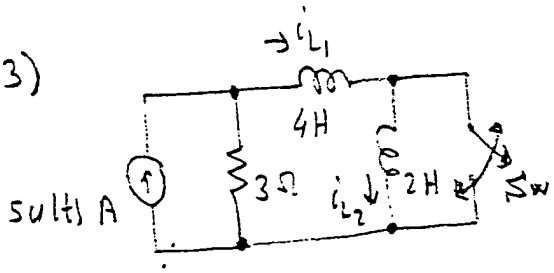
22)



$i_1(0^-) = 3$ A.

Find $i_1(t)$ and $i_2(t)$ for $t \geq 0$.

23)

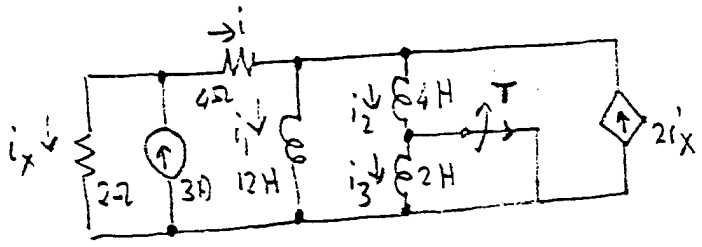


$i_{L_1}(0^-) = 2$A, $i_{L_2}(0^-) = 1$ A

Sw opens at $t = 3$ sec and recloses at $t = 5$ sec.

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

24)

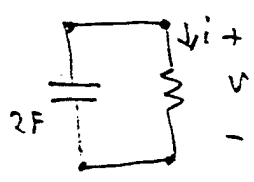


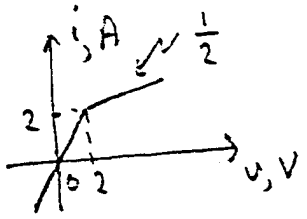
$i_1(0) = 2$A, $i_2(0) = 2$A, $i_3(0) = 4$ A.

$i_2(T^-) = -6$ A.

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

25)

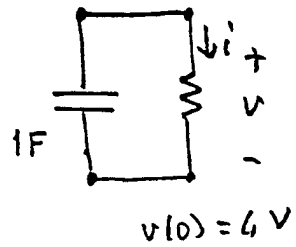




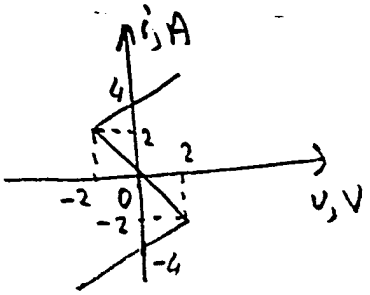
$v(0) = 4.5$ V

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

26)

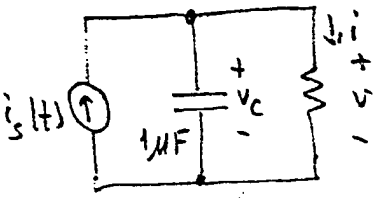


$v(0) = 4\ V$

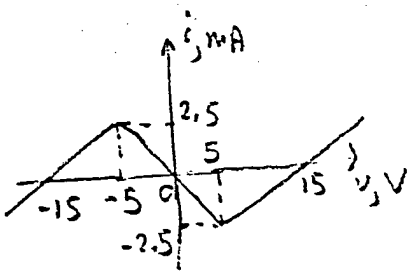


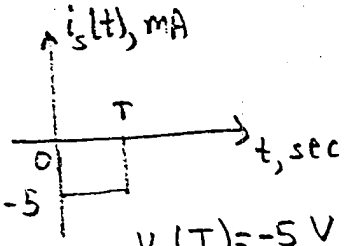
Find and sketch $v(t)$ for $t>0$.

27)



$v_c(0) = 15\ V$

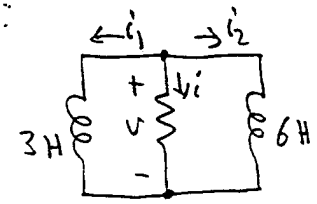


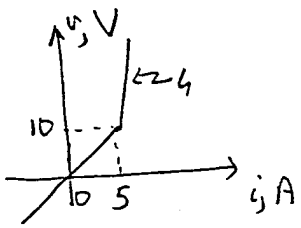


$v_c(T) = -5\ V$

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

28)

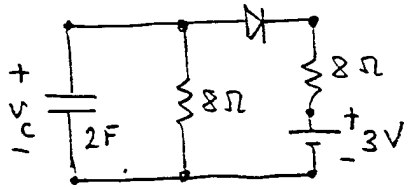




$i_1(0) = 3\ A,\ i_2(0) = -10\ A.$

Find $i_1(t)$ and $i_2(t)$ for $t>0$.

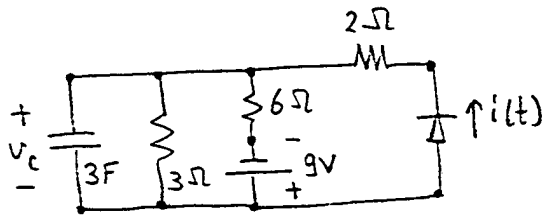
29)



$v_c(0) = 10\ V.$

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

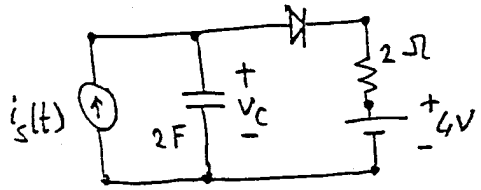
30)

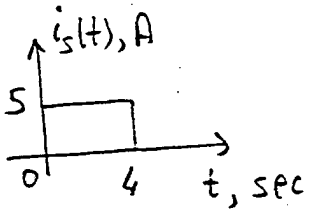


$v_c(0) = 8\ V.$

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

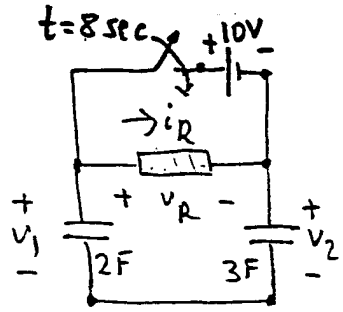
31)

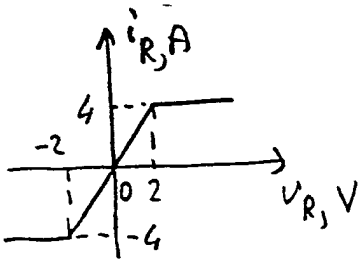




$v_c(0) = -1\ V.$

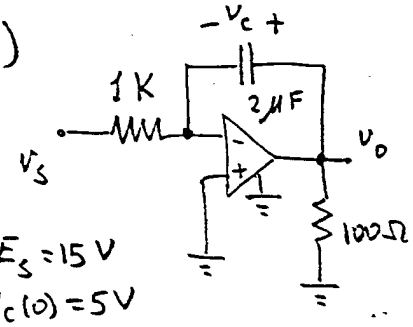
Find and sketch $v_c(t)$ for $t>0$.

32) 



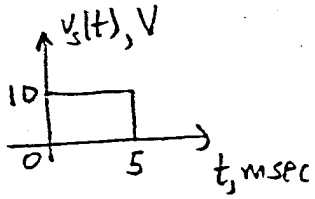
$v_1(0) = 6V$, $v_2(0) = -2V$.

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

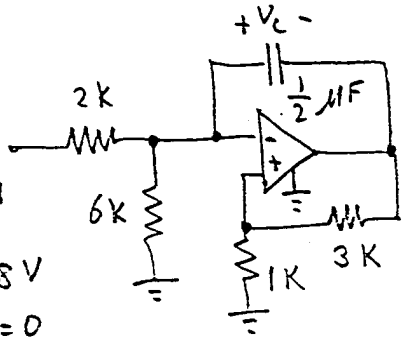
33) 

$E_s = 15$ V

$v_c(0) = 5$ V



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

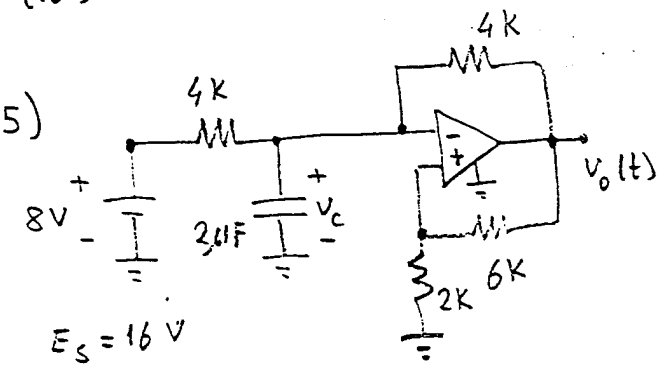
34) 

$E_s = 18$ V

$v_c(0^-) = 0$

$v_1(t) = 12\,u(t)$ V.

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

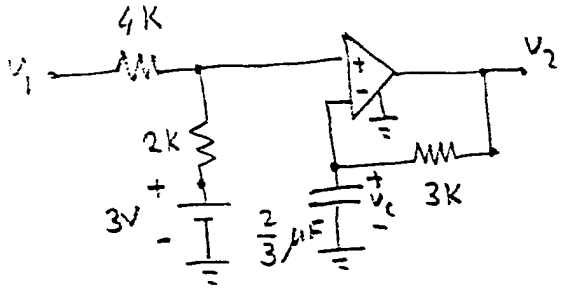
35) 

$E_s = 16$ V

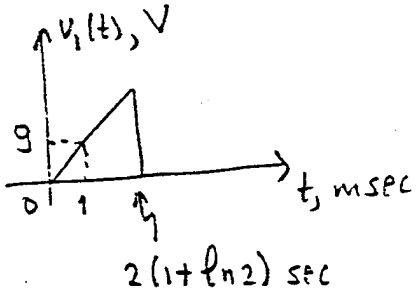
$v_c(0) = 0$

$v_o(0) = 0$.

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

36) 

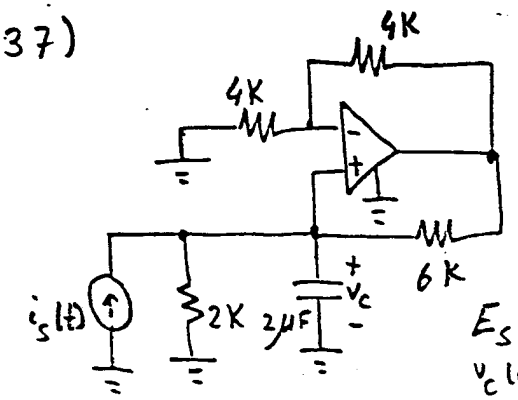
$E_s = 14$ V

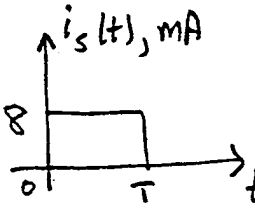


At $t=0$ the op-amp is in the linear region.

Find and sketch $v_c(t)$ and $v_2(t)$ for $t \geq 0$.

37)



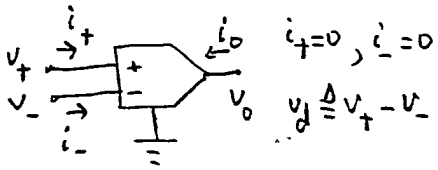


Find and sketch $v_c(t)$ for $t \geq 0$.

$E_s = 16$ V

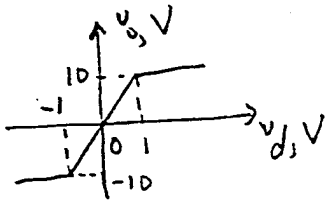
$v_c(0) = 0$, $v_c(T) = 12$ V

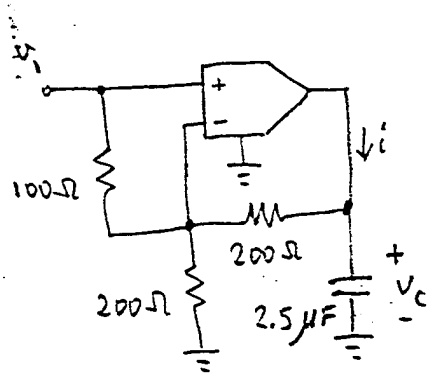
38)



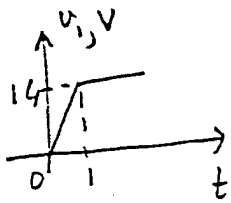
$i_+ = 0$, $i_- = 0$

$v_d \triangleq v_+ - v_-$



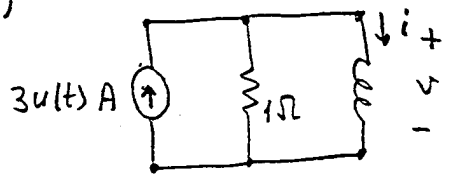


$v_c(0) = 0$

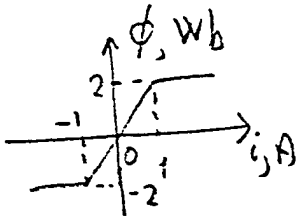


Find and sketch $i(t)$ for $t \geq 0$.

39)



$i(0^-) = -1$ A



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

40) In a LTI dynamic circuit there is a single independent source $v_s(t)$, and the voltage $v_o(t)$ is the circuit variable of interest (the output variable). Let $g(t) = (e^{-2t} + e^{-3t})u(t)$ be the step response for $v_o(t)$. Find the zero-state response $v_o(t)$ to the excitation shown below.