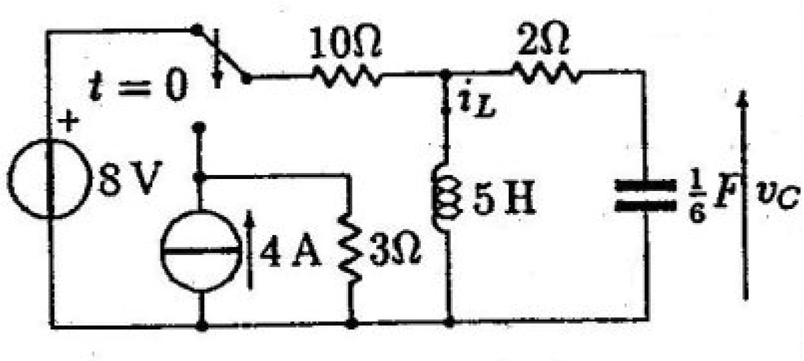
Esercitazione 5

- **Esercizio 1**

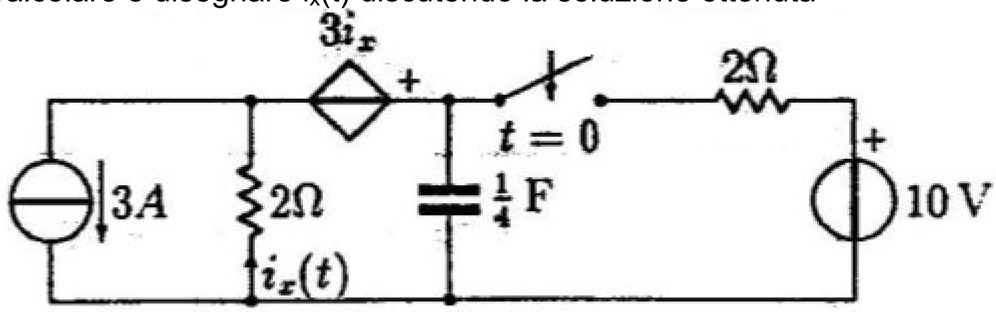
Calcolare i_l ; v_c ; $\frac{di_l}{dt}$; $\frac{dv_c}{dt}$ all'istante $t = 0^+$

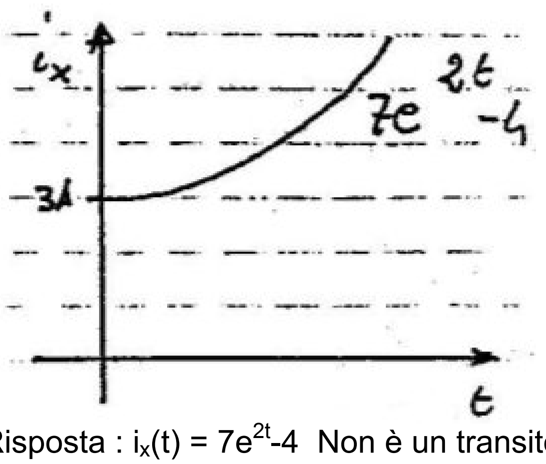


Risposta: $i_l(0^+)= i_l(0^-)=0.8A$; $v_c(0^+)= v_c(0^-)=0V$; $\left.\frac{di_l}{dt}\right|_{0^+} = 16/375$; $\left.\frac{dv_c}{dt}\right|_{0^+} = 16/25$

- **Esercizio 2**

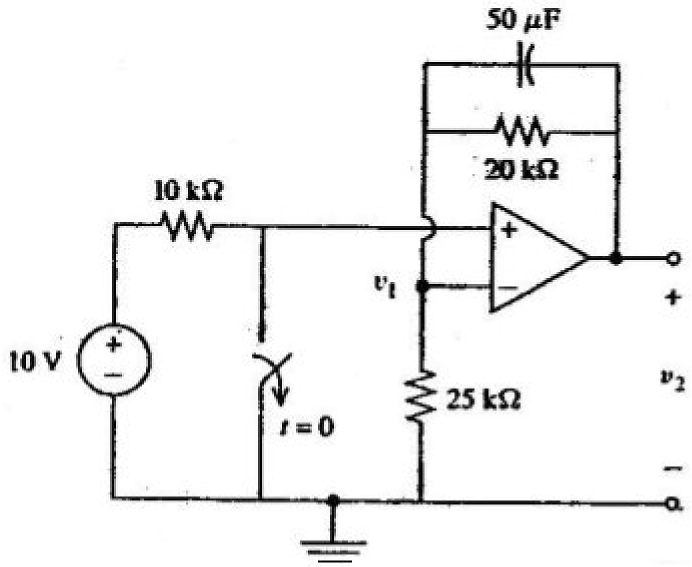
Calcolare e disegnare $i_x(t)$ discutendo la soluzione ottenuta





Risposta : $i_x(t) = 7e^{2t}-4$ Non è un transitorio

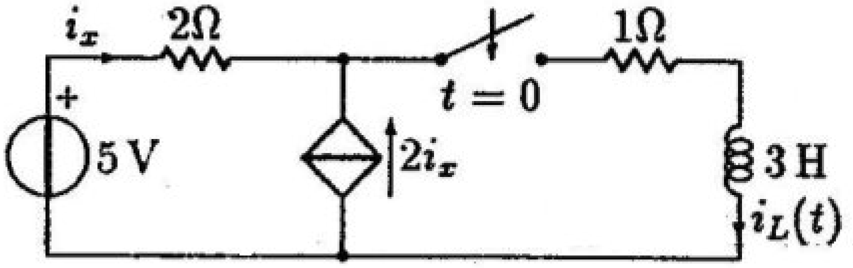
- **Esercizio 3**

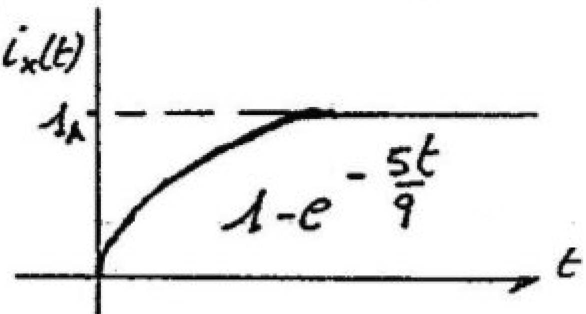


$V_2(t) = 18-8e^{-t}$
t >=0
0,t<0

- **Esercizio 4**

Calcolare e disegnare $i_L(t)$ per $t \geq 0^+$



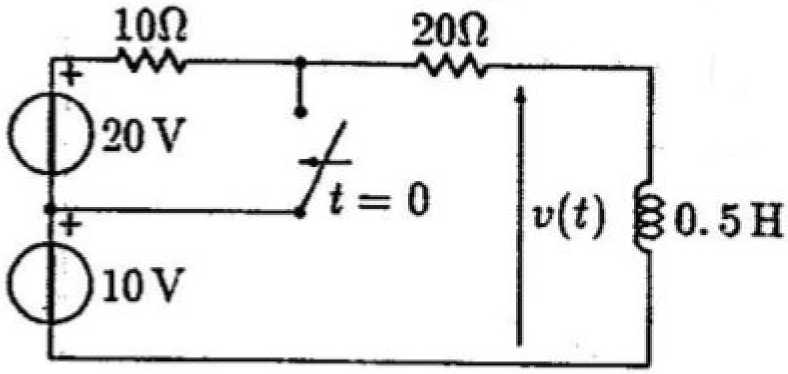


Risposta: t<0 : $i_L = 0$;   t≥0 : $i_L = 1-e^{-(5/9)t}$

Data ultima revisione 18/03/2004
Autore: Vito Daniele e Roberto Graglia

- **Esercizio 5**

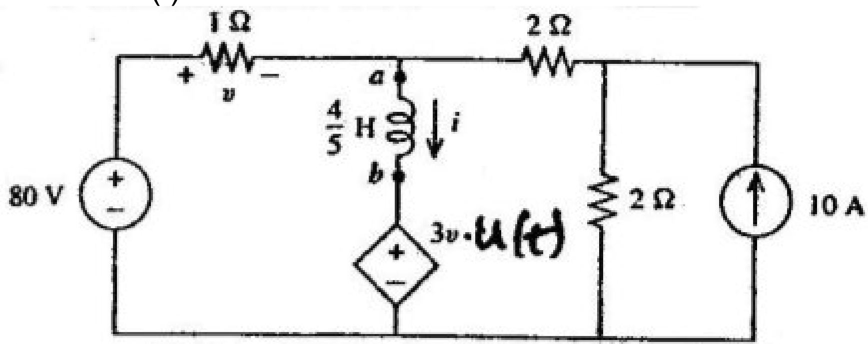
Calcolare v(t) per $t \geq 0^+$



Risposta: $v(t)=-10e^{-40t}$

- **Esercizio 6**

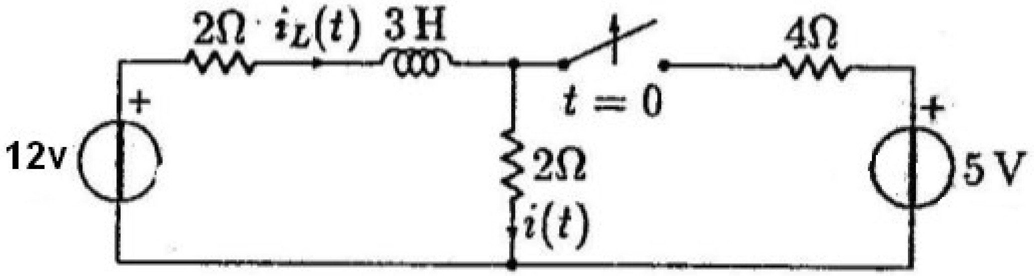
Calcolare i(t)

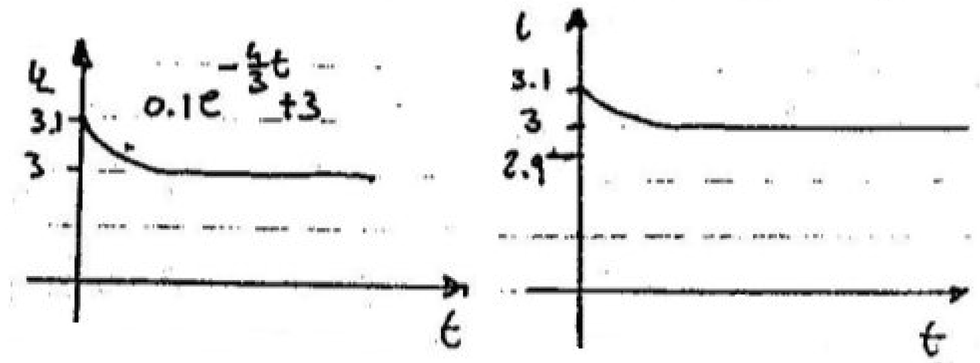


Risposta: $i(t) = 10+75e^{-4t}$A

- **Esercizio 7**

Calcolare e disegnare $i_L(t)$ e $i(t)$

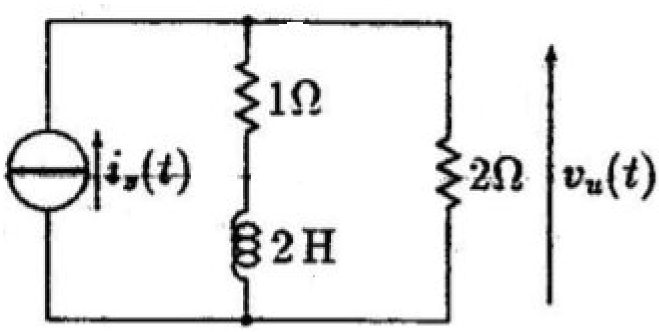


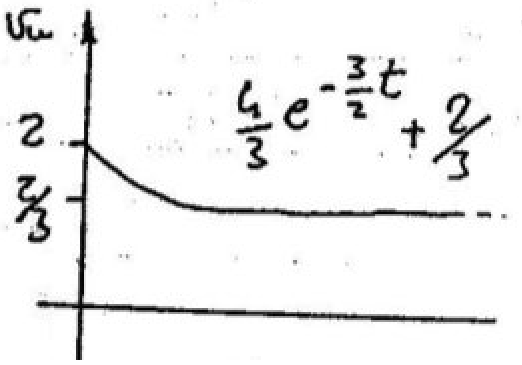


Risposta: t<0 : $i_L(t)$= 3.1A; t≥0 : $i_L(t)$= $3+0.1e^{-(4/3)t}$; t<0 : v(t)= 2.9V ;
t≥0 : v(t)= $3+0.1e^{-(4/3)t}$

- **Esercizio 8**

Nella rete in figura determinare $v_u(t)$ sapendo che il generatore di corrente è $i_s(t)$= u(t)A

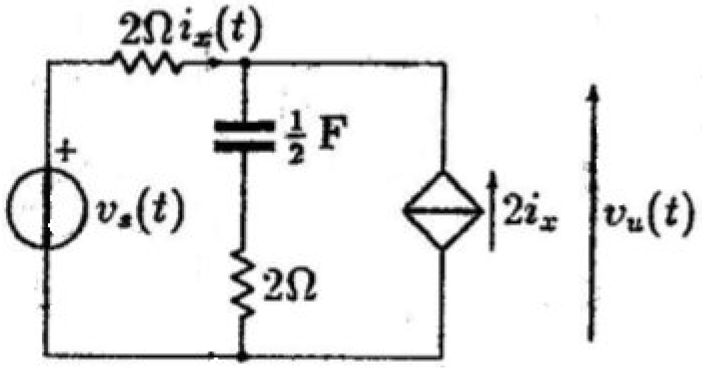


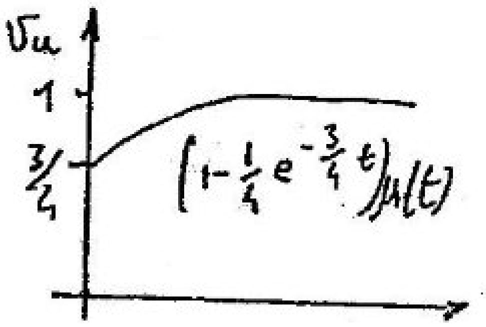


Risposta: $v_u(t) = 4/3e^{-(3/2)t}+2/3$

- **Esercizio 9**

Noto l'ingresso $v_s(t) = u(t)$V calcolare e disegnare l'uscita $v_u(t)$

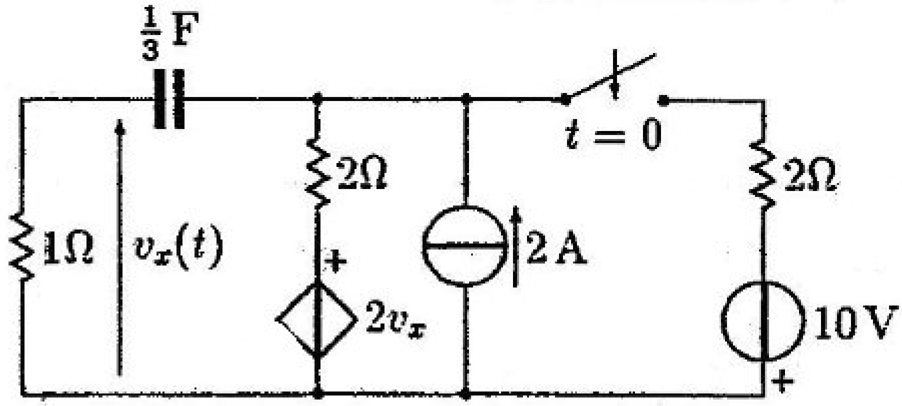


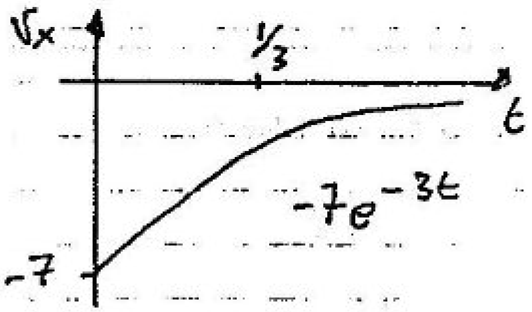


Risposta: $v_u(t) = (1-(1/4)e^{-(3/4)t})u(t)$

- **Esercizio 10**

Calcolare e disegnare $v_x(t)$

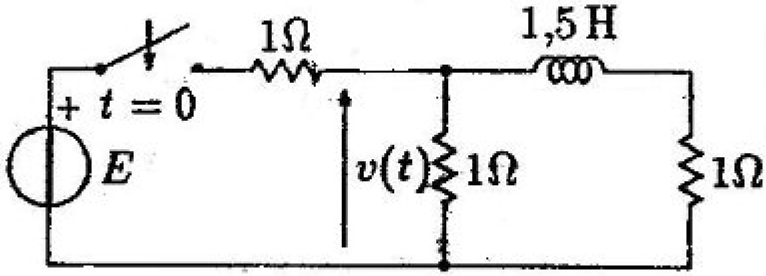




Risposta: t>0 : $v_x(t)= -7e^{-3t}$

- **Esercizio 11**

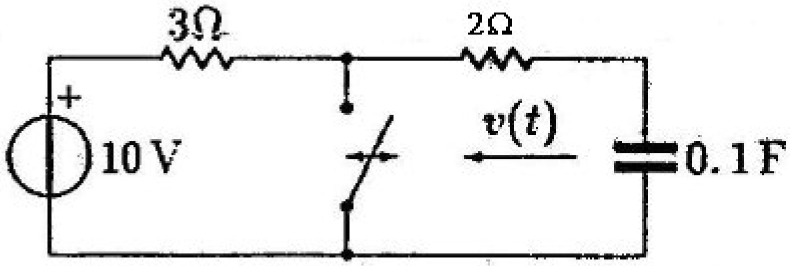
Calcolare v(t)



Risposta : v(t) = $E/3((1/2)e^{-t}+1)$

- **Esercizio 12**

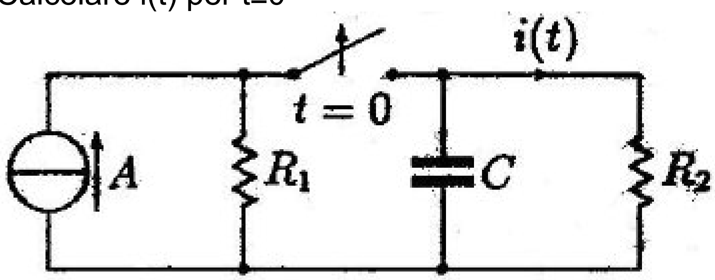
Nel circuito in figura lo switch si apre in t=0 e si chiude in t=0.4, calcolare v(t) per $t \geq 0^+$



Risposta : $0<t<0.4$: $v(t)=4e^{-2t}$; $t>0.4$: $v(t)=-5.5e^{-5(t-0.4)}$

- **Esercizio 13**

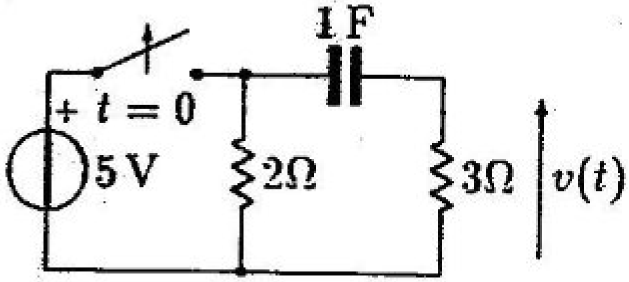
Calcolare i(t) per $t \geq 0^+$



Risposta : $i(t)=A\frac{R_1}{R_1+R_2}e^{-t/\tau}$, $\tau=R_2C$

- **Esercizio 14**

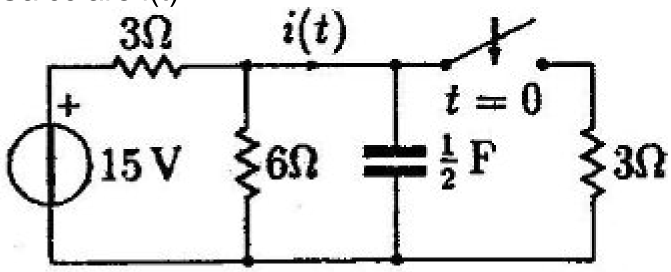
Calcolare v(t) per $t \geq 0^+$



Risposta : $v(t)=-3e^{-(1/5)t}$

- **Esercizio 15**

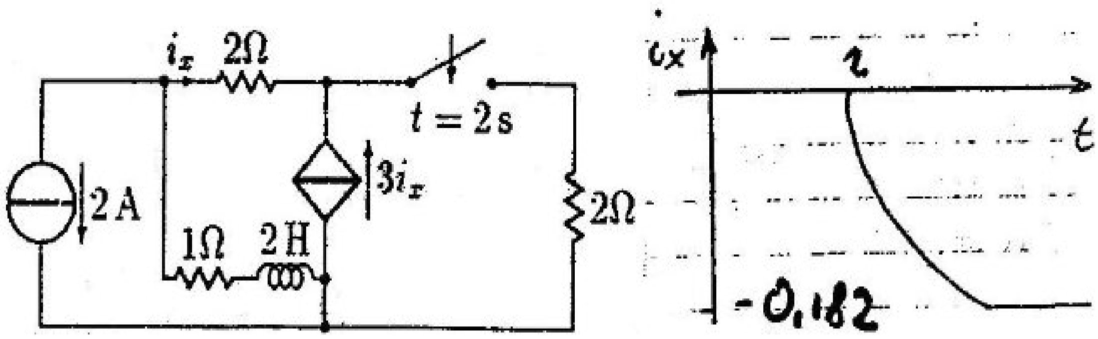
Calcolare i(t)



Risposta : $i(t)=2(1-e^{-(5/3)t})$

- **Esercizio 16**

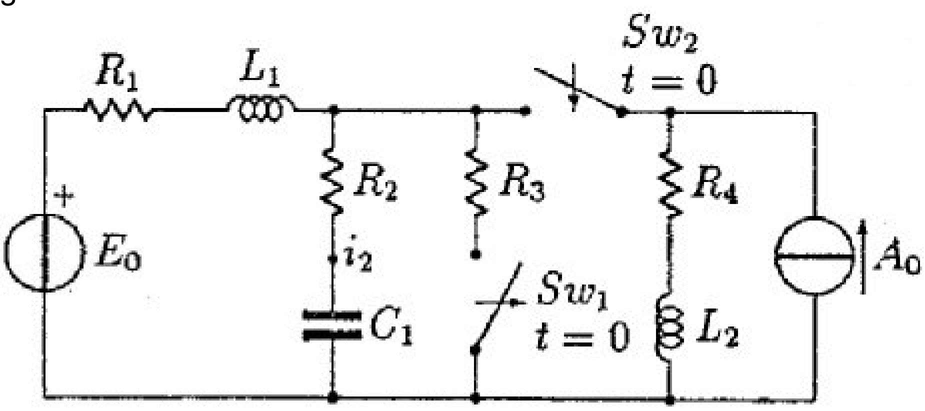
Calcolare e disegnare $i_x(t)$



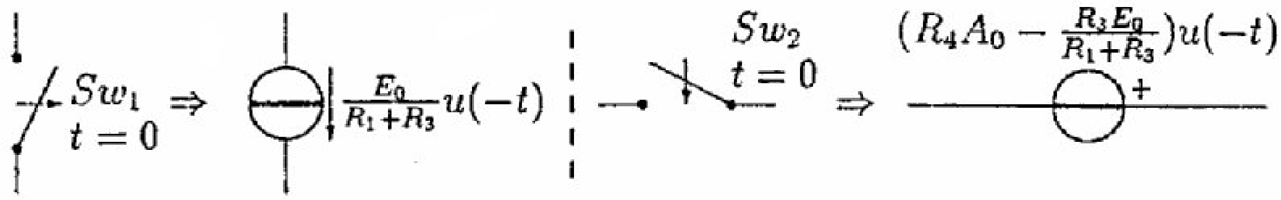
Risposta : $i_x(t)=0.182e^{-(11/2)(t-2)}-0.182$

- **Esercizio 17**

Nella rete in figura i generatori E_0 e A_0 sono in continua e la rete è operante da $t = -\infty$. Determinare i generatori equivalenti agli interruttori e l'uscita i(t) per $t=0^+$ $t=0^-$ giustificando la discontinuità



Riposta: $i_2(0^-) = 0$, $i_2(0^+) = \frac{E_0}{R_1+R_3}$



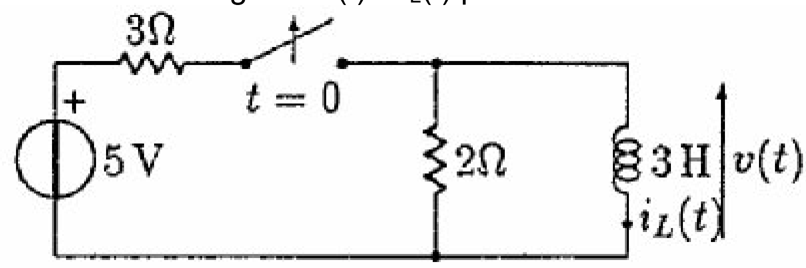
- **Esercizio 18**

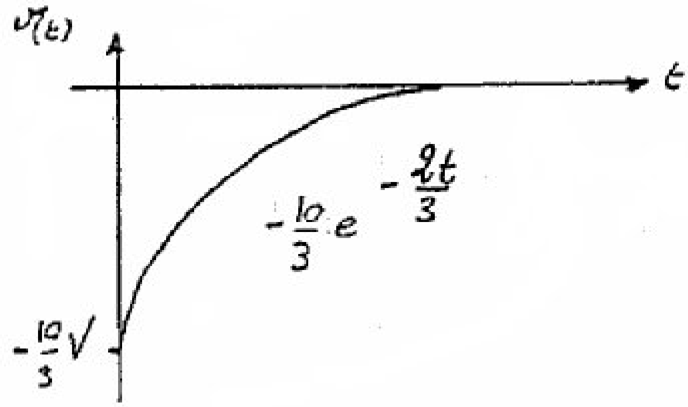
Un alimentatore con tensione V_0 e resistenza R carica un condensatore C, quanto vale l'energia erogata dall'alimentatore?

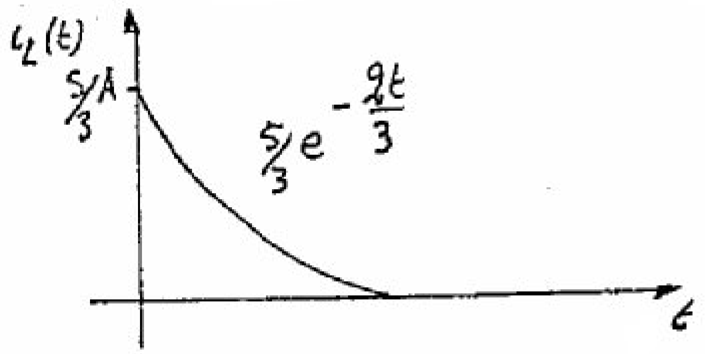
Risposta : $W=CV_0$

- **Esercizio 19**

Calcolare e disegnare v(t) e $i_L(t)$ per $t \geq 0^+$







Risposta : $t \geq 0$: $i_L = (5/3)e^{-(2/3)t}$; $t<0$: $v(t)=0$; $t \geq 0$: $v(t) = -2i_L = -(10/3)e^{-(2/3)t}$

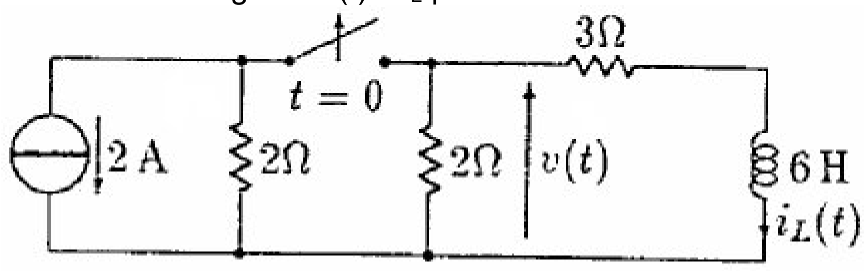
- **Esercizio 20**

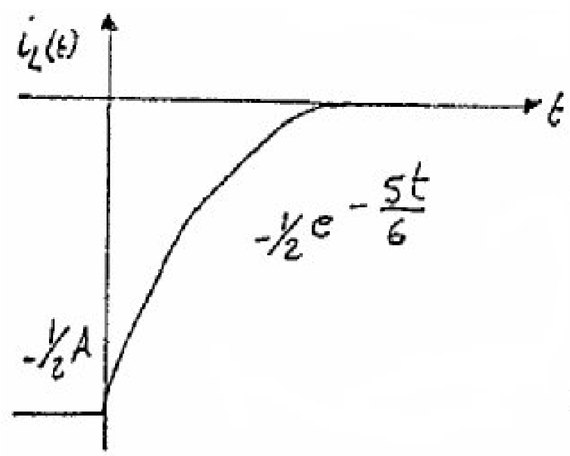
Nell'ipotesi di ingressi in c.c. qual è la formula che esprime l'uscita di una rete con una costante di tempo τ a partire dall'istante t_0?

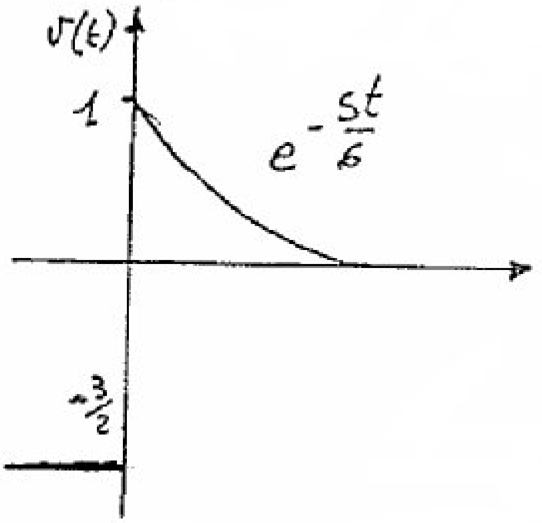
Risposta : $y(t) = [y(t_{0+})-y_\infty]e^{-\frac{t-t_0}{\tau}}+y_\infty$

- **Esercizio 21**

Calcolare e disegnare $v(t)$ e i_L per $t \geq 0^+$



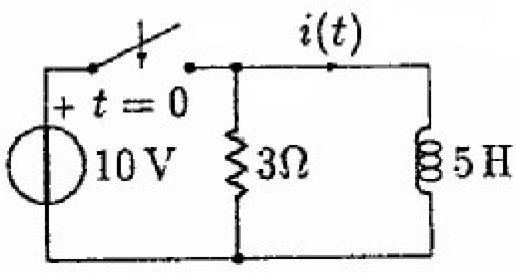




Risposta : $t<0$: $i_L = -1/2$ A ; $t \geq 0$: $i_L = -(1/2)e^{-(5/6)t}$; $t<0$: $v(t) = -3/2$;
$t \geq 0$: $v(t) = e^{-(5/6)t}$

- **Esercizio 22**

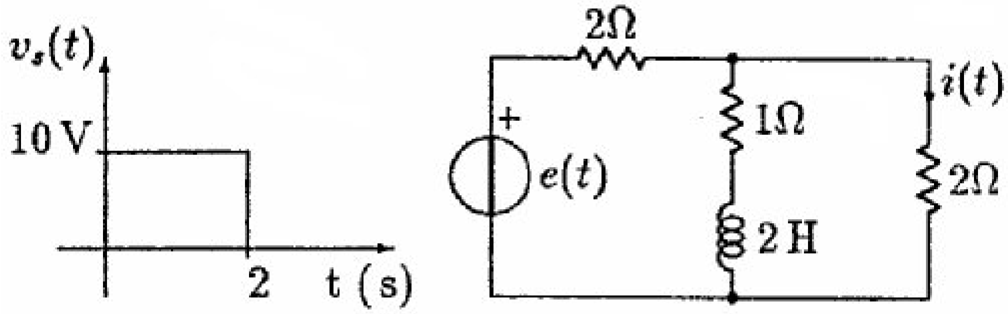
Determinare $i(0^+)$ e $\left.\frac{di}{dt}\right|_{0^+}$ assumendo che per t<0, l'interruttore è aperto da lungo tempo



Risposta : $i(0^+)= i(0^-)=0A$; $\left.\frac{di}{dt}\right|_{0^+} = 2A/s$

- **Esercizio 23**

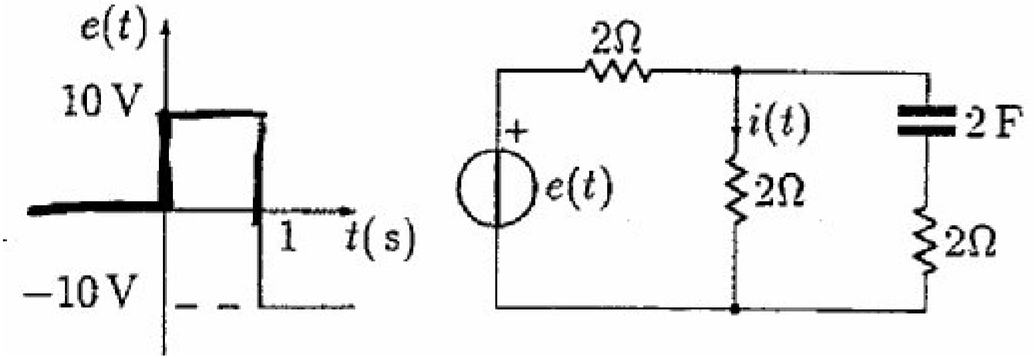
Calcolare i(t) noto l'andamento temporale dell'eccitazione alla rete v_s in figura



Risposta : $i(t) = (5/4)(1+e^{-t})u(t)-(5/4)(1+e^{-(t-2)})u(t-2)$

- **Esercizio 24**

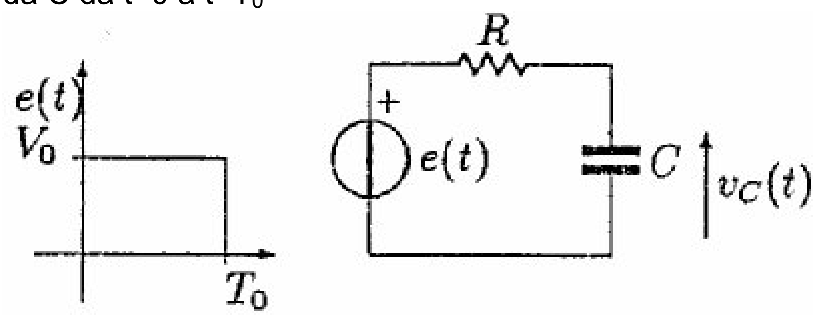
Noto l'andamento temporale di e(t) fornire un'espressione analitica per l'uscita i(t)



Risposta : i(t) = $\left(\frac{5}{2}-\frac{5}{6}e^{-\frac{1}{6}t}\right)u(t)+\left(-\frac{10}{3}e^{\frac{1-t}{6}}-5\left(1-e^{\frac{1-t}{6}}\right)\right)u(t-1)$

- **Esercizio 25**

Nota l'eccitazione del generatore e(t) sulla rete, calcolare $v_c(t)$ tracciarne l'andamento al variare di R e commentare la risposta, ed infine si calcoli l'energia immagazzinata da C da t=0 a t=T_0

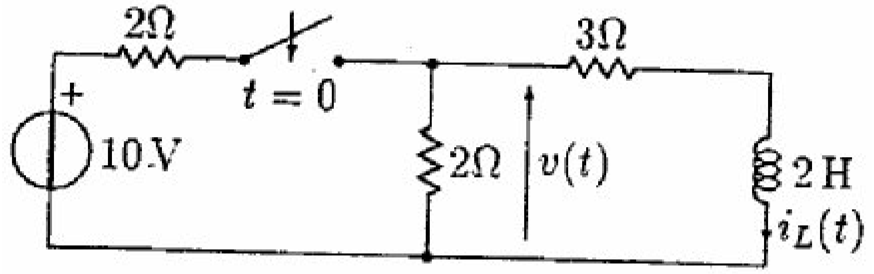


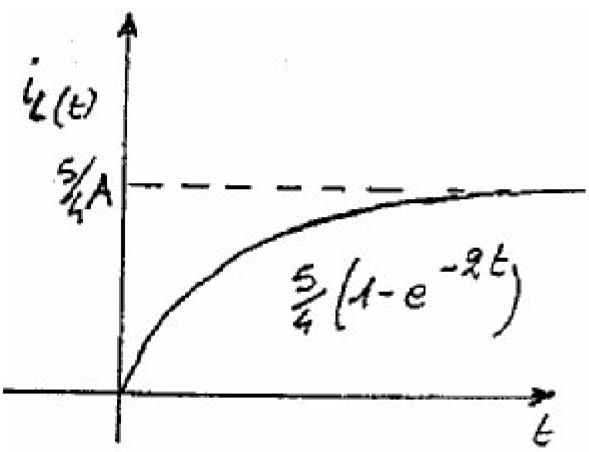
Risposta : $0 \le t \le T_0$: $v_c(t)$ = $v_0\left(1-e^{\frac{-t}{\tau}}\right)$; $T_0 \le t \le \infty$: $v_c(t)$ = $v_0\left(1-e^{\frac{-T_0}{\tau}}\right)e^{\frac{T_0-t}{\tau}}$

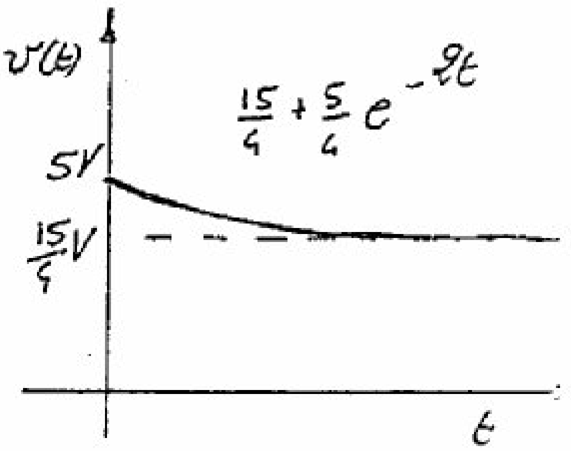
$\tau = RC$

- **Esercizio 26**

Calcolare e disegnare v(t) e i_L per $t \geq 0^+$







Riposta: $t < 0 : i_L = 0$; $t \geq 0 : i_L = \frac{5}{4}(1 - e^{-2t})$;
$t < 0 : v(t) = 0$; $t \geq 0 : v(t) = \frac{15}{4} + \frac{5}{4}e^{-2t}$