

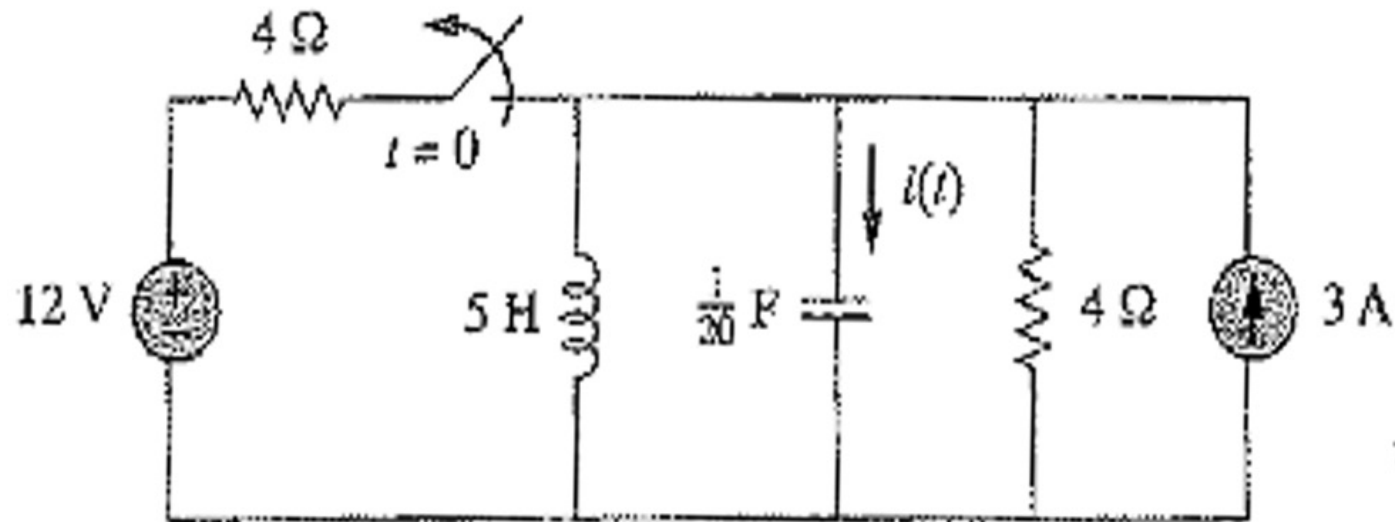
# 2<sup>nd</sup> Order Transients – 4

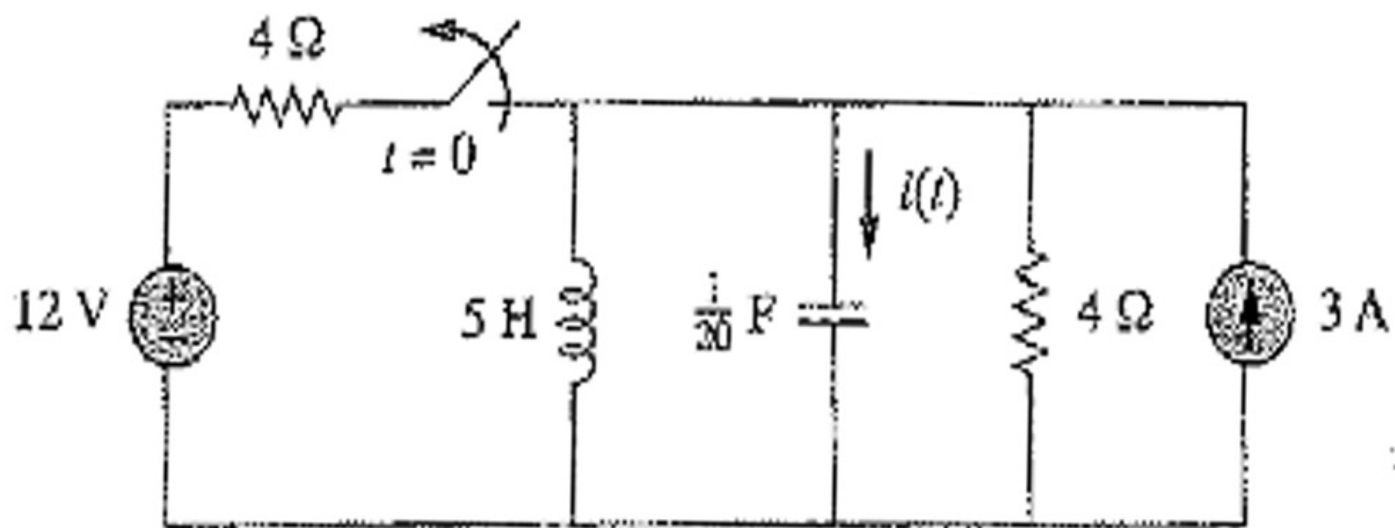
examples

# Beyond $i_L(t)$ or $v_C(t)$

1. Identify type (series/parallel) and values of R,L,C
2. Root characteristic equation, to find form
3. Find  $i_L(0)$  and  $v_C(0)$
4. For variable of interest, find  $x(0)$ ,  $x'(0)$ , and  $x(\infty)$ 
  - Note that the derivative might be hard to find; alternatively, could solve for  $i_L(t)$  or  $v_C(t)$  and then “propagate” that answer to the desired variable
5. Assemble answer

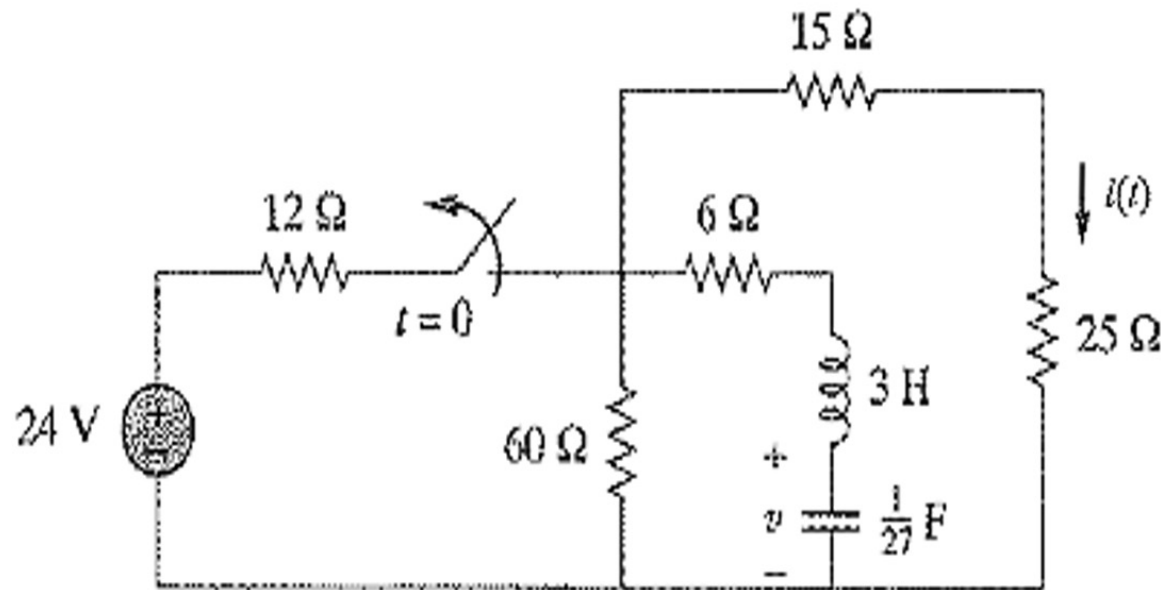
**Example:** find the capacitor current for  $t > 0$ .

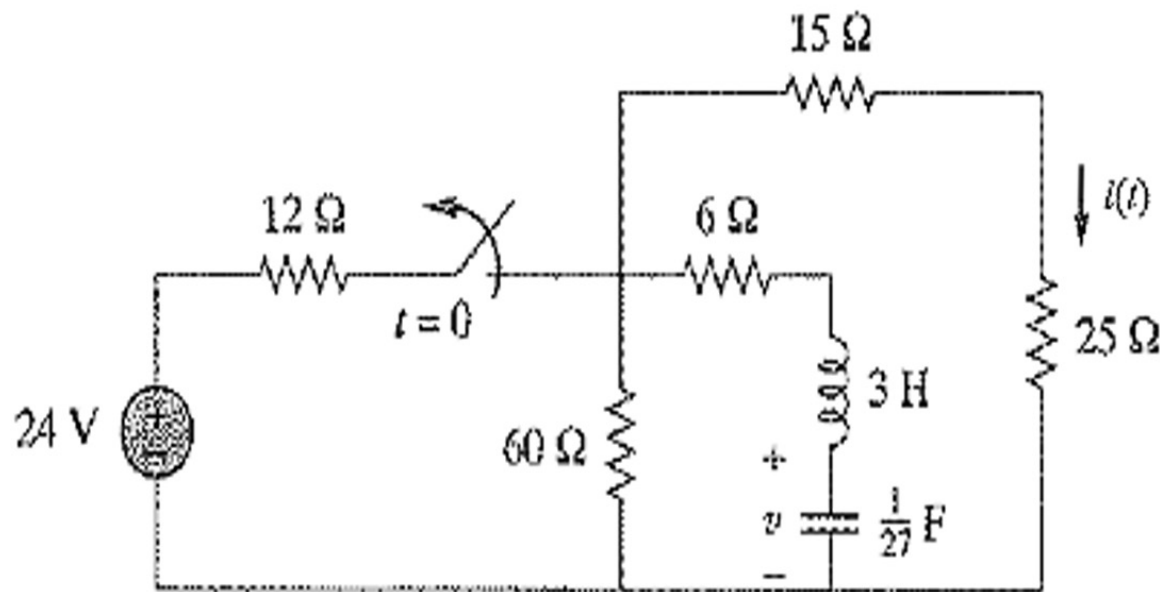




$$i(t) = e^{-t} - e^{-4t} A$$

**Example:** Find the 25 ohm resistor's current for  $t > 0$



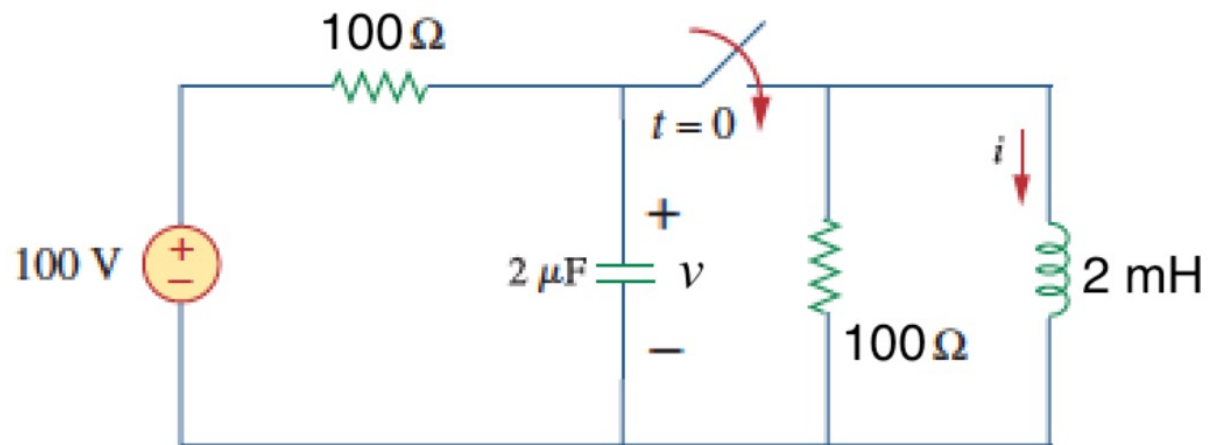


$$v(t) = 27e^{-t} - 3e^{-9t} \text{ V}$$

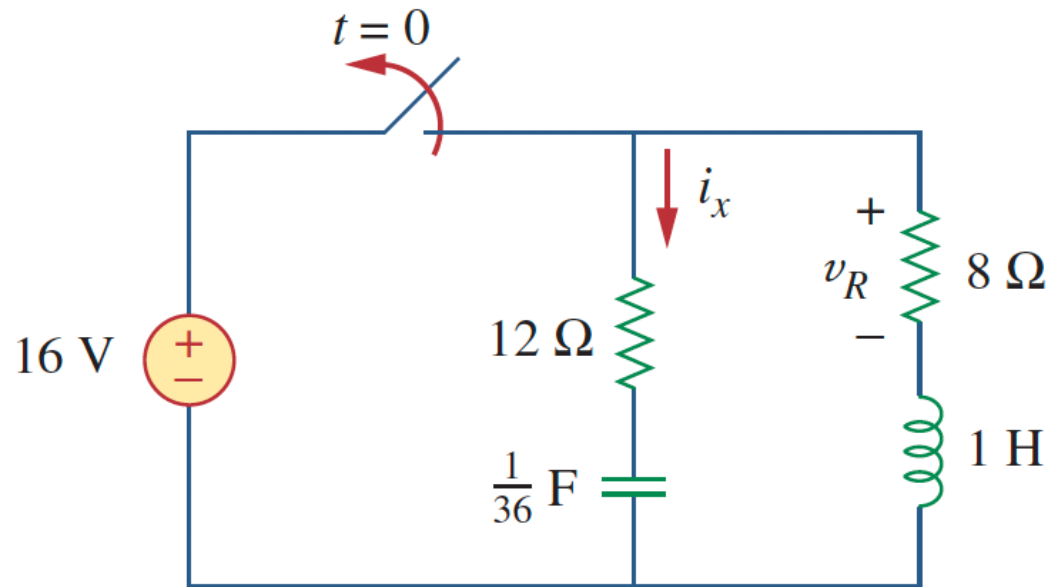
$$i_{25}(t) = 0.6(e^{-t} - e^{-9t}) \text{ A}$$

# Other Situations

Switch opens? Switch closes?

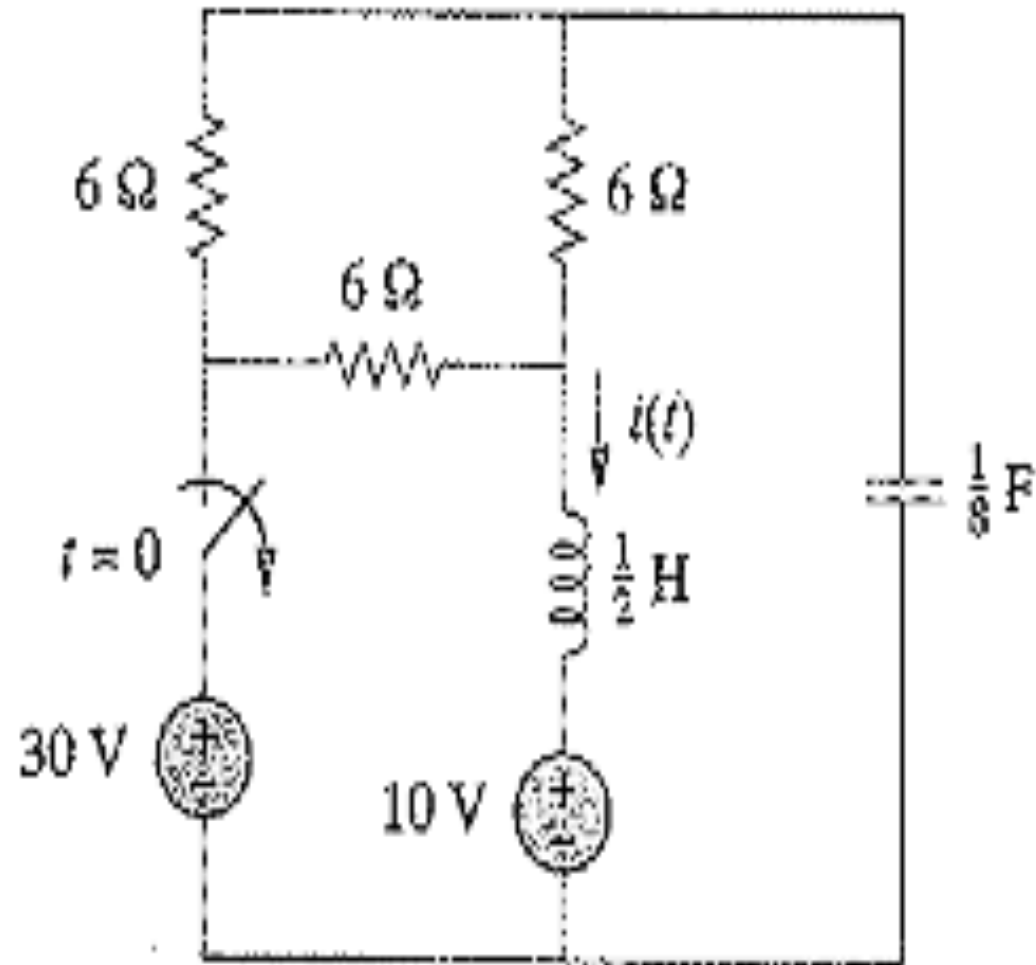


- Switch opens? Switch closes?





- Switch opens? Switch closes?



What would you do here if the input was a unit step?

