

In the tutorial today, we will learn about reactive circuits with either capacitance or inductance, but not both. If there is only one reactive element, notice that the decay (exponent of the decreasing function, for example, α in $\exp(-\alpha t)$) term of currents and voltages depends only on the effective resistance seen by the reactive element. Verify this for each question.

Question 1) Find the equation for the current through the inductor, if a step voltage of 10V is applied to the circuit. What will be your answer if the inductor had an initial current of $i_0 A$.

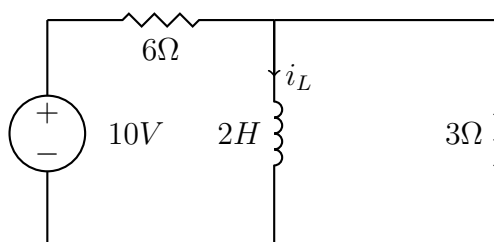


Figure 1

Question 2) In Question 1, instead of a step function, the following voltage function is applied. Find the current i_L for $t > 0$.

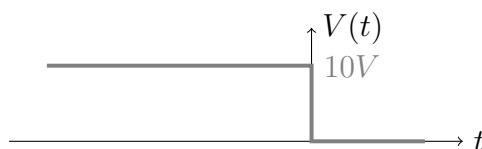


Figure 2

Question 3) In the circuit below, the switch S is closed at $t = 0$. Find the current through the capacitor using mesh analysis. (No source transformation is permitted)

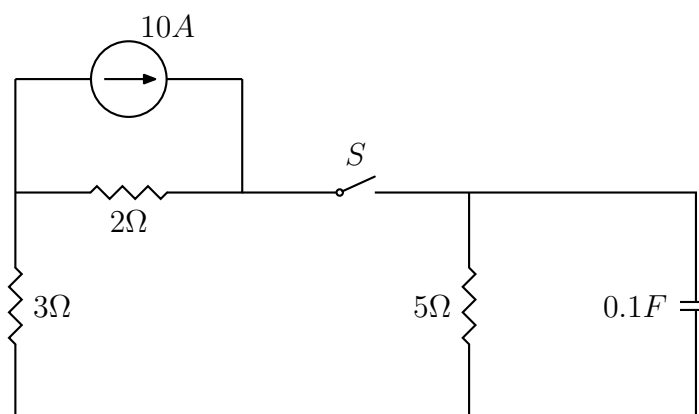


Figure 3

Question 4) If the switch is opened at $t = 0$ what is the current through the inductor for $t > 0$.

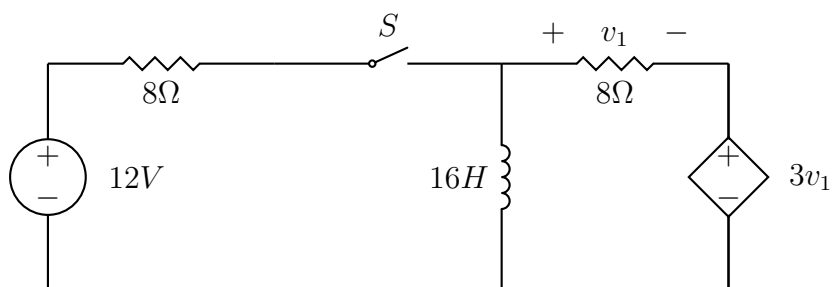


Figure 4

Question 5) Find $v_1(t)$ and $v_2(t)$, if the switch is opened at $t = 0$.

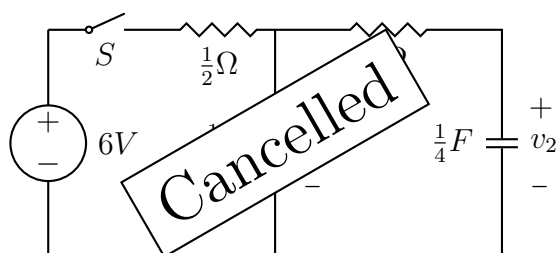


Figure 5

Question 6) Find $v(t)$ and $i(t)$ if the switch is opened at $t = 0$.

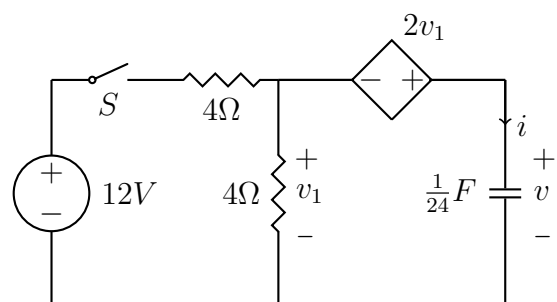


Figure 6

Question 7) Find the answer to Question 2 using source transformation.