EE 202 (122) – HW4

Due Saturday April 6, 2013

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Question 1:

For the circuit shown in Figure 1, find the following:

a) What is the value of R_L that will maximize the power transfer to the load (R_L).
b) With this value of R_L (part a), what the maximum power in R_L.

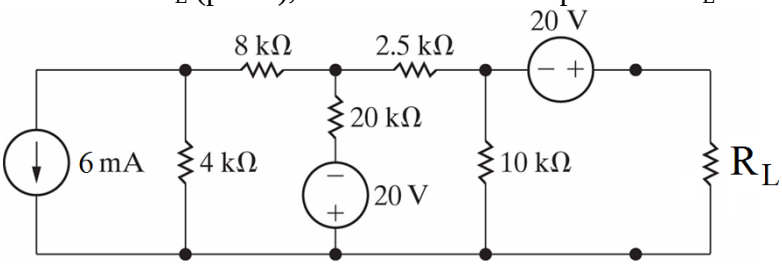


Figure 1

Question 2:

For the circuit shown in Figure 2, find the following:

a) What is the value of R_L that will maximize the power transfer to the load (R_L).
b) With this value of R_L (part a), what the maximum power in R_L.

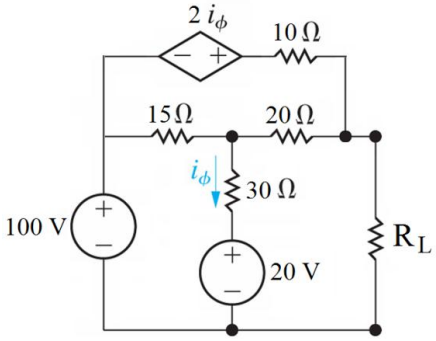


Figure 2

Question 3:

For the circuit shown in Figure 3, use the superposition principle to find the current i_o.

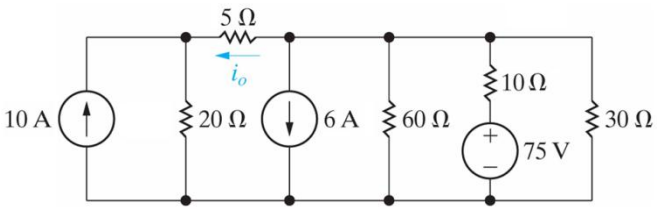
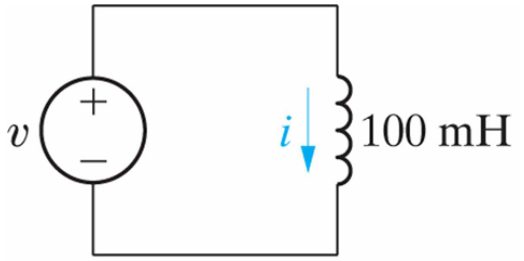


Figure 3

Question 4:

For the circuit shown in Figure 4, find the following:

a) Find and sketch the current i(t).
b) Find and sketch the power p(t) in the inductor.
c) Find and sketch the energy w(t) stored in the inductor.



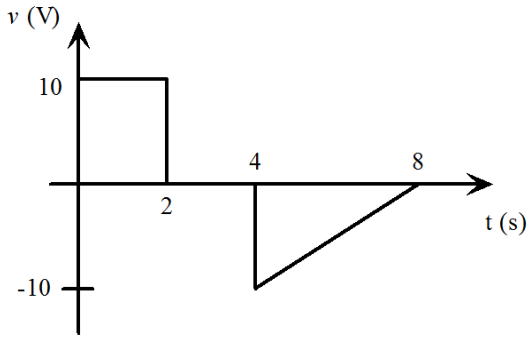


Figure 4

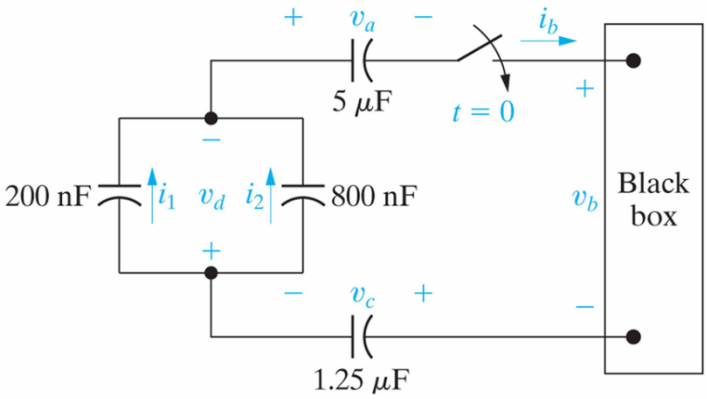
Question 5:

The four capacitors in the circuit below are connected across the terminals of a black box at t = 0. The resulting current i_b for t > 0 is known to be

$$i_b = 500e^{-40t}\ \mu\text{A}.$$

If $v_a(0) = 25$ V, $v_c(0) = -20$ V, $v_d(0) = 45$ V, find the following for $t \geq 0$.

a) $v_b(t)$,
b) $v_a(t)$,
c) $v_c(t)$,
d) $v_d(t)$,
e) $i_1(t)$, and
f) $i_2(t)$.



Question 6:

In the circuit shown in Figure 6, the switch has been closed for a long time. At t = 0 it is opened. Find the current $i_o(t)$ for $t \geq 0$.

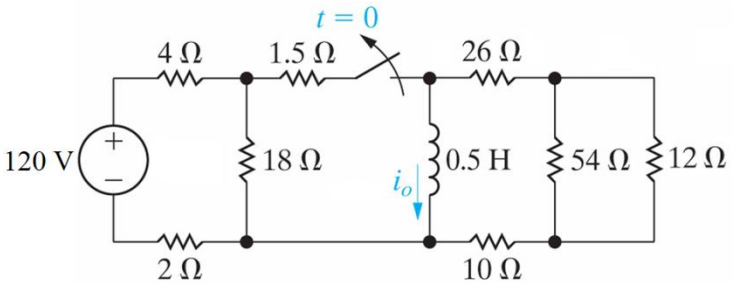


Figure 6

Question 7:

In the circuit shown in Figure 7, the two switches operate together; that is, they either open or close at the same time. The switches have been closed for a long time before opening at t = 0.

a) How many microjoules of energy have been dissipated in the 68 kΩ resistor 10 ms after the switches open.
b) How long does it take to dissipate 90% of the initially stored energy?

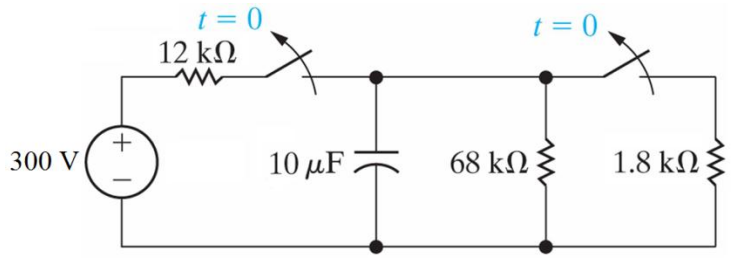


Figure 7