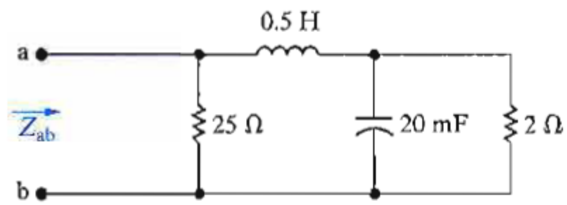
ECE 3364 HW 09, Fall 2016 due 11/08

Problem 1. Nilsson, 8th edition Problem 13.8

13.8 Find the poles and zeros of the impedance seen looking into the terminals a,b of the circuit shown in Fig. P13.8.

Figure P13.8



Problem 2. Nilsson, 8th edition Problem 13.13

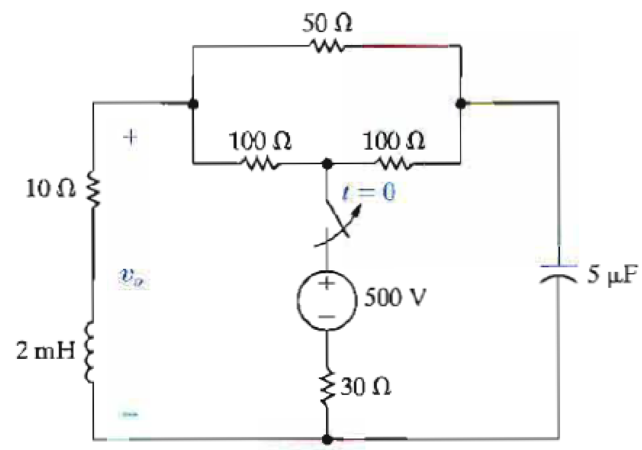
13.13 The switch in the circuit in Fig. P13.13 has been closed for a long time before opening at $t = 0$.
PSPICE

a) Construct the s-domain equivalent circuit for $t > 0$.

b) Find V_o.

c) Find v_o for $t \geq 0$.

Figure P13.13



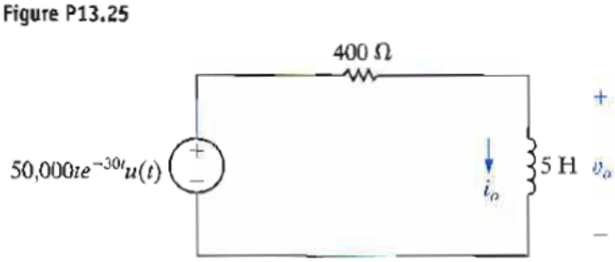
Problem 3. Nilsson, 8th edition Problem 13.25

13.25 There is no energy stored in the circuit in Fig. P13.25 at the time the voltage source is energized.
PSPICE

a) Find V_o and I_o.

b) Find v_o and i_o for $t \geq 0$.

Figure P13.25



Problem 4. Nilsson, 8th edition Problem 13.27

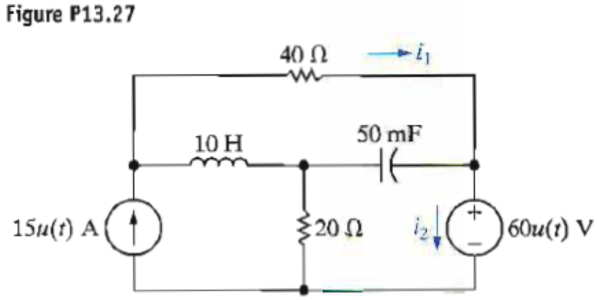
13.27 There is no energy stored in the circuit in Fig. P13.27 at the time the sources are energized.
PSPICE

a) Find $I_1(s)$ and $I_2(s)$.

b) Use the initial- and final-value theorems to check the initial- and final-values of $i_1(t)$ and $i_2(t)$.

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

Figure P13.27



Problem 5. Nilsson, 8th edition Problem 13.32

13.32 There is no energy stored in the circuit in Fig. P13.32 at the time the current source turns on. Given that $i_g = 100u(t)$ A:

PSPICE

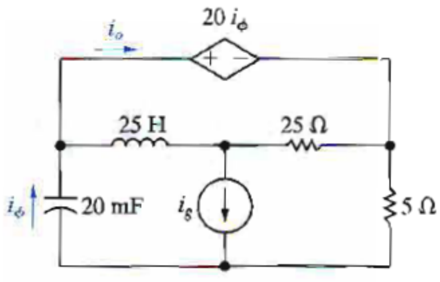
a) Find $I_o(s)$.

b) Use the initial- and final-value theorems to find $i_o(0^+)$ and $i_o(\infty)$.

c) Determine if the results obtained in (b) agree with known circuit behavior.

d) Find $i_o(t)$.

Figure P13.32



Problem 6.

You've all seen a room with a ceiling light that can be turned on/off from two different switches; one at either end of the room. To change the light from on-to-off or from off-to-on, you simply change the position of either of the two switches.

Construct such a circuit using your choice of one or more switches. The light is simply a load with power provided by two input wires with a voltage potential of 120 Vrms across them. Construct this circuit using two input wires, two switches, and a load representing the light. Each of the two switches can be selected as single pole switches or double pole switches.

(a) A single pole switch has two nodes A and B. Nodes A and B are either connected by a short i.e. "on", or the nodes are open-circuited i.e. "off". Generally, a wire is connected to each of the two nodes A and B of the switch so that the circuit is broken when the switch is in the "off" positon and completed when the switch is in the on position.

(b) A double pole switch has 3 nodes A, B, and C. The double pole switch also has two possible positions, "up" or "down". In the up position nodes A and B are connected by a short and node C is open-circuited. In the down position, nodes A and C are connected by a short and node B is open-circuited. Generally, a wire can be connected to each of the three nodes A, B, C.

(c) Double pole switches cost 4 times more than single pole switches.

Design the least expensive circuit using two switches so that a light can be turned on/off from either of the two switches.