Homework 2

EE 225

August 3, 2017

Problem 1. What must be the relationship between C_{eq} and C_1 and C_2 in (a) of the figure of the networks if (a) and (c) are equivalent ? Repeat for the network shown in (b).

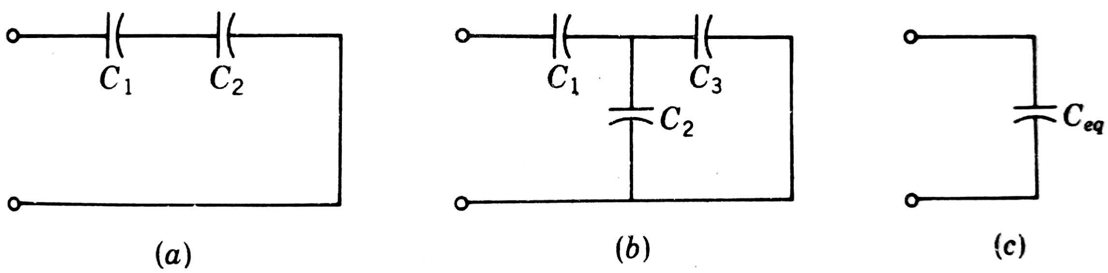

Fig. P3-1.

Problem 2. What must be the relationship between L_{eq} and L_1, L_2 and M for the networks of (a) and of (b) to be equivalent to that of (c)?

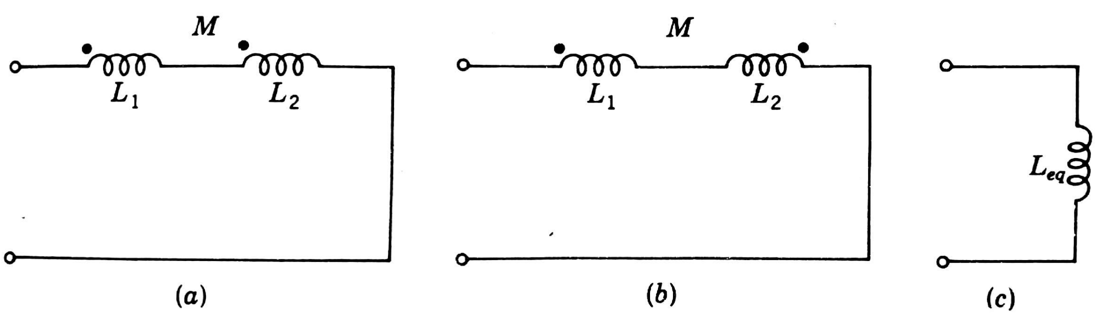

Fig. P3-2.

Problem 3. Repeat Prob. 2 for the three networks shown in the accompanying figure.

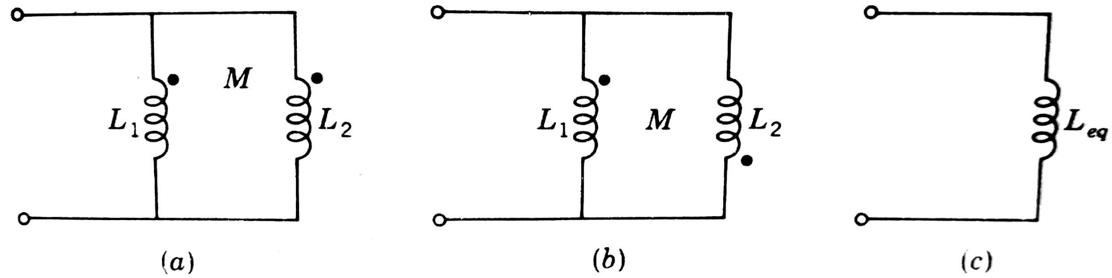

Fig. P3-3.

Problem 4. The network of inductors shown in the figure is composed of a 1-H inductor on each edge of a cube with the inductors connected to the vertices of the cube as shown. Show that, with respect to vertices a and b, the network is equivalent to that in (b) of the figure When $L_{eq} = \frac{5}{6}$H. Make use of symmetry in working this problem, rather than writing Kirchhoff laws.

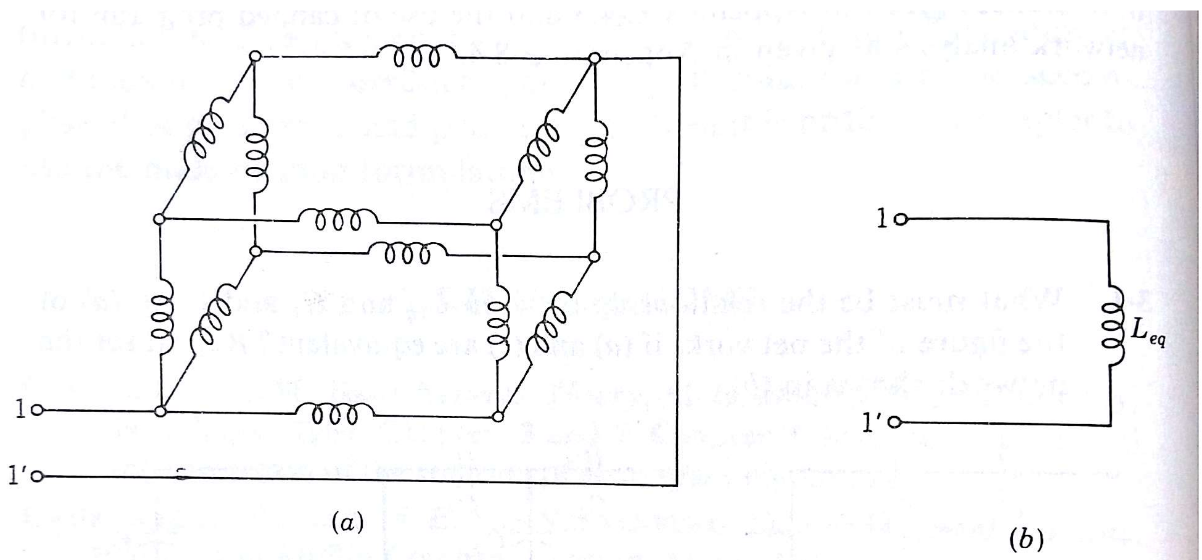

Fig. P3-4.

Problem 5. In the networks of Prob. 4, each 1-H inductor is replaced by a 1-H capacitor, and L_{eq} is replaced by C_{eq}. What must be the value of C_{eq} for the two networks to be equivalent ?

Problem 6. This problem may be solved using the two Kirchhoff laws and voltage-current relationships for the elements. At time to after the switch K was closed, it is found that v_2 = +5 V. You are required to deter-mine the value of $i_2(t_0)$ and $di_2(t_0)$/dt.

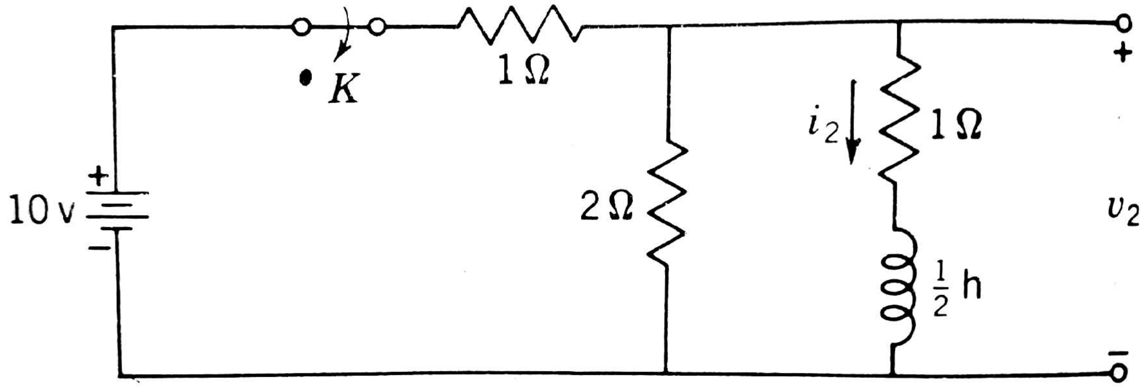

Fig. P3-6.

Problem 7. Demonstrate the equivalence of the networks shown in Fig. 3-17 and so establish a rule for converting a voltage source in series with an inductor into an equivalent network containing a current source.

Problem 8. Demonstrate that the two networks shown in Fig. 3-18 are equivalent.

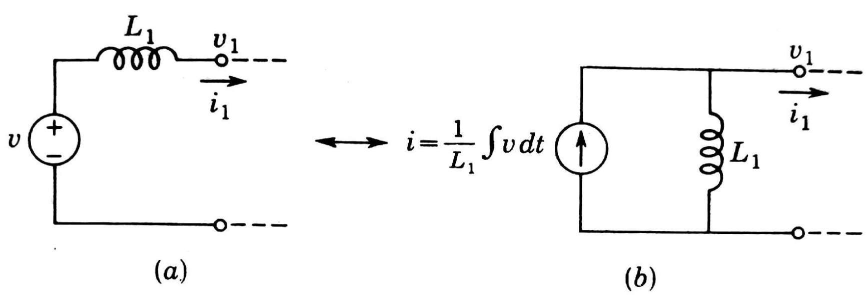

Fig. 3-17. Source transformation for a network with a single inductor.

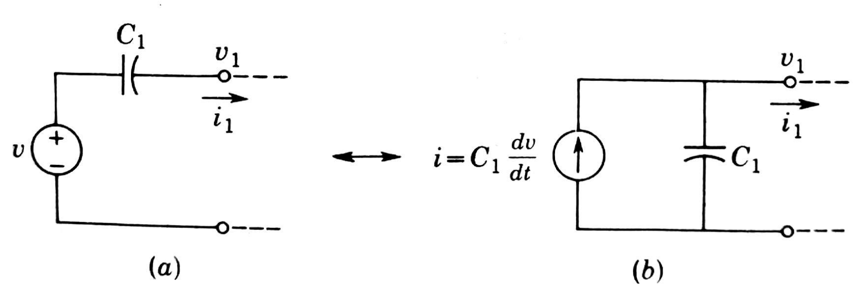

Fig. 3-18. Source transformation involving one capacitor.