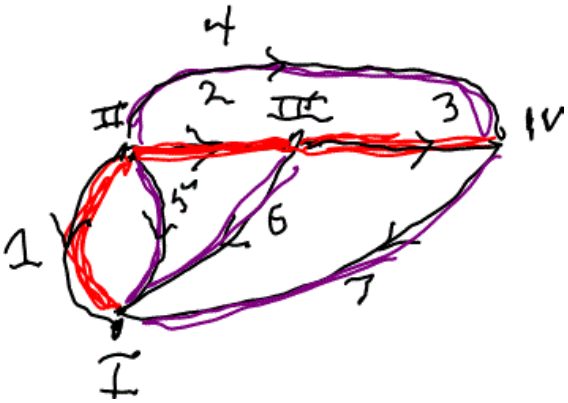
File: H:/coursesF18/610/610F17Hmwk1.doc RWN 09/05/18

610 Fall 2018 – Homework 1 Due Th 09/13/18

1. (40 points, KVL, KCL)



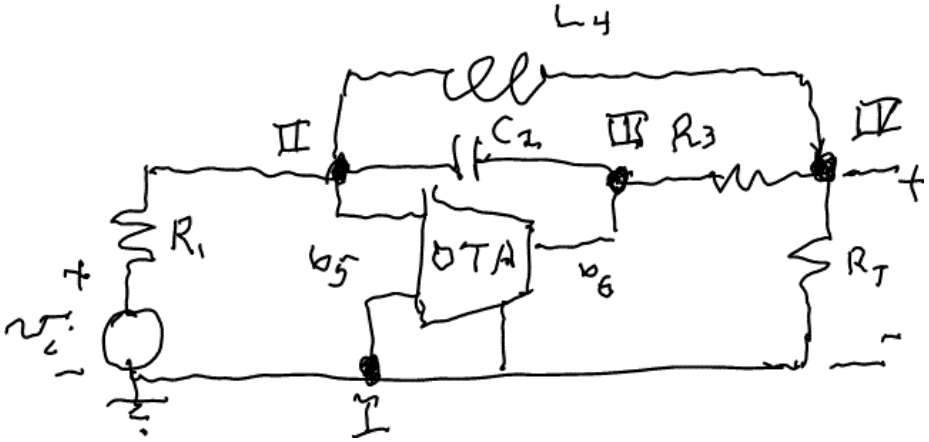
For the above graph of the circuit of the 08/30/18 class notes:

a) Instead of the tree shown and used in class use branches 3, 4, and 7 as the tree in that order and the cotree in the order 1, 2, 5, 6. Give the resulting cut-set and tie-set matrices.

b) Form the product cut-set matrix times the transpose of the tie-set matrix and compare with the results in class.

c) Find the number of trees by giving the incidence matrix I_{inc} using nodes I, II, III and form the determinant of $I_{inc}I_{inc}^T$.

2. (60 points, Av=Bi, semistate)



Using the graph cut-set and tie-set matrices of the 08/30/18 class and its seven branch circuit shown above, set up the Av=Bi description and from that the semistate equations Esx=Ax+Bu where the semistate column vector is $x=[v_t^T, i_l^T]^T$ and $u=v_i$ is the single input (also s=d/dt or the Laplace transform variable). If the output y is the single voltage, v_6, at the output of the OTA, give the output equation y=Cx.