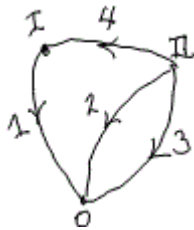


EE 610 Final Exam Fall 2017 Take Home due prior to end of scheduled exam
 Open Book Open Notes 100 points, 2 hours.
 Notebooks are due at the end of the exam. Good luck and have a good semester break.

1. (25 points, 20 minutes)



For the above circuit

- Give all possible trees indexing them by the branch numbering ([for example the tree of branches 1,2, and 5 would be the tree labelled (125)].
- For all the trees find the cutset matrices and find a transformation matrix T such that $\text{Cutset}(ij)=T\text{cutset}(ik)$ for the two lowered number trees.

2. (20 points, 20 minutes)

Consider the input admittance $y(s) = [s(s^2+a)] / [(s^2+1)(s^2+4)]$

Give a 1st Cauer synthesis for all a for which $y(s)$ is PR.

3. (20 points, 20 minutes)

Give a and b such that the scattering matrices (here scalar) S_1 and S_2 are BR.

$$S(s)=2s^2=2s^2/[2s^2+as+b]/[2s^2+as+b]=S_1/S_2$$

4. (35 points, 30 minutes)

For the following circuit

- Draw the graph with branches numbered as the elements and oriented down or to the left with nodes numbered I, II, (and ground).
- Set up the semistate equations from the graph using cutset, tieset, and $AV=BI$ equations in which the input voltage $u=e1$ and output $y=v5$. $v3$ and $v4$ are OTA input and output branches.
- Find the voltage transfer function $V_{out}/V_{in}=y/u(s)$

