## Questions:

What is the effective voltage when two voltage sources are in series?
What happens when two voltage sources are placed in parallel?
What is the effective current when two current sources are in parallel?
What happens when two current sources are placed in series?
What is the effect of placing a resistor in parallel with a voltage source?
What is the effect of placing a resistor in series with a current source?
What is source conversion?
What is node analysis?
What nodes are constrained in node analysis?
How many independent equations are needed in node analysis?
What is mesh analysis?
What loop currents are constrained in mesh analysis?
How many independent equations are needed in mesh analysis? (a little bit more tricky to answer)
Circuit Reduction - review problem

a) If we solved this circuit using the method in homework 1, how many independent equations are needed to determine the voltage across each resistor?
b) How many nodes are in the above circuit? (Answer: five)
c) Use circuit reduction techniques to find the voltage across each resistor.
(Answer: $V R 1=3 V, V R 2=V R 3=2 V, V R 4=4 V, V R 5=3 V, V R 6=V R 7=V R 8=1 V$ )

Source Transformation

a) Use source transformation techniques to obtain a simplified circuit with Vs,Rs and RLoad (Answer: Vs $=4 \mathrm{~V}, \mathrm{Rs}=1 \mathrm{k} \Omega$, RLoad $=3 \mathrm{k} \Omega$ )

Simple mesh/node analysis

a) How many nodes in the circuit? (Answer: two) How many mesh loops? (Answer: two)
b) Use node analysis to find VR1 and IR1. (Answer: 10 V and 2A)
c) Use mesh analysis to find VR1 and IR (Answer: 10V and 2A, it better be the same)

a) How many nodes in the circuit? (Answer: two) How many mesh loops? (Answer: two)
b) Use node analysis to find VR1 and IR1. (Answer: 5 V and 1 A )
c) Use mesh analysis to find VR1 and IR1(Answer: 5V and 1A, it better be the same))

## Mesh/Node


a) How many nodes are in the above circuit? loops? (Answer: 4 nodes, 4 loops)
b) How many nodes are constrained? (Answer: none)
c) How many loops are constrained? (Answer: one)
d) Is node analysis or mesh analysis easier in this circuit? (Answer: node analysis yields three independent equations, mesh analysis yields three independent equations(without circuit reduction))
e) Determine VR3 using either mesh or node analysis. (Answer: 6 V ,

Node analysis, $V 1=75 \mathrm{~V}, V 2=15 \mathrm{~V}, V 3=9 \mathrm{~V}, \mathrm{~V} 4=0 \mathrm{~V}$ )
Mesh analysis: $i 1=6 \mathrm{~mA}, i 2=3 \mathrm{~mA}, i 3=1.5 \mathrm{~mA}, i 4=0.375 \mathrm{~mA}$ )

a) How many nodes are in the above circuit? loops? (Answer: 5 nodes, 4 loops)
b) How many nodes are constrained? (Answer: two)
c) How many loops are constrained? (Answer: one)
d) Is KCL or KVL easier in this circuit? (Answer: same number of independent equations with either approach )
e) Apply the method you (we) chose to find VR9. (Answer: VR9 $=0.47 \mathrm{~V}$,

Node analysis, $V 1=4 \mathrm{~V}, V 2=3.58 \mathrm{~V}, V 3=1.57 \mathrm{~V}, \mathrm{~V} 4=2.04 \mathrm{~V}, \mathrm{~V} 5=0 \mathrm{~V}$ )
Mesh analysis: $i 1=1 \mathrm{~mA}, i 2=1.11 \mathrm{~mA}, i 3=2.09 \mathrm{~mA}, i 4=1.57 \mathrm{~mA}$ )

