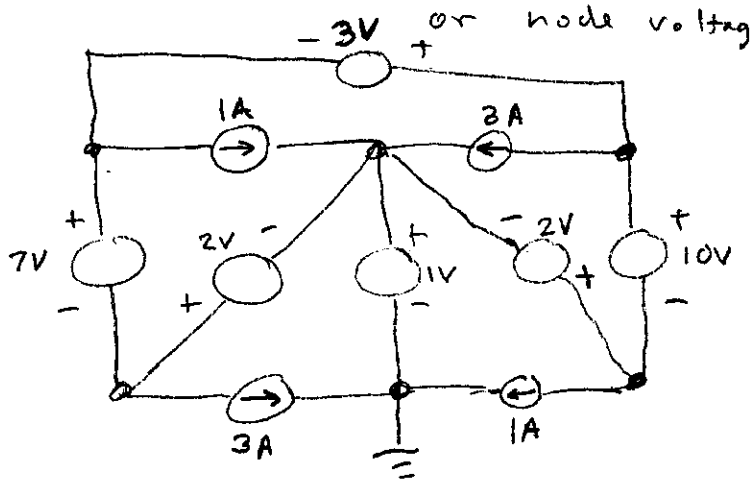
EE 210 - Extra Quiz - week 2

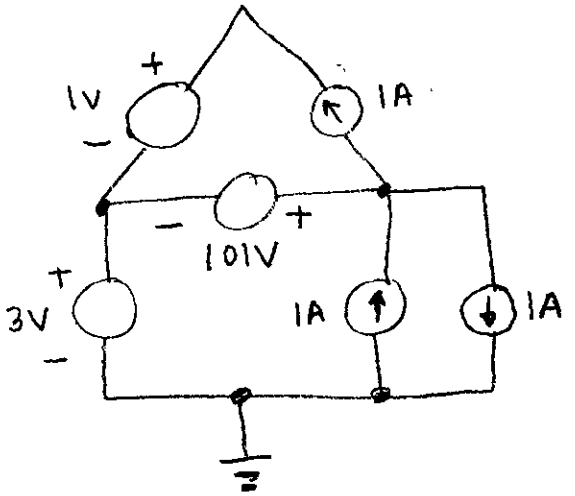
Name Key

Are these circuits valid?

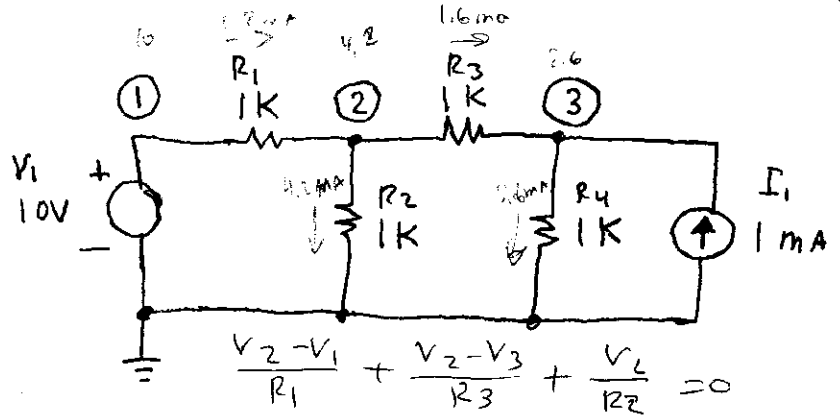
If so -- show all node voltages and branch currents, on the schematic

If not -- why not? (which rule is violated) and indicate at least one branch current or node voltage that cannot be calculated.





Find the node equations,
and solve for all node voltages



$$\frac{V_2-V_1}{R_1}+\frac{V_2-V_3}{R_3}+\frac{V_2}{R_2}=0 \qquad \frac{V_3-V_2}{R_3}+\frac{V_3}{R_4}-I_1=0$$

$$\frac{V_2-V_1}{1K}+\frac{V_2-V_3}{1K}+\frac{V_2}{1K}=0 \qquad \frac{V_3-V_2}{1K}+\frac{V_3}{1K}-1mA=0$$

$$10\left(-\tfrac{1}{1K}\right)+V_2\left(\tfrac{3}{1K}\right)+V_3\left(\tfrac{-1}{1K}\right)=0 \qquad V_2\left(-\tfrac{1}{1K}\right)+V_3\left(\tfrac{2}{1K}\right)-1mA=0$$

$$-10+3V_2-V_3=0 \qquad -V_2+2V_3-1=0$$

$$-10+3(1+2V_3)-V_3=0 \qquad V_2=1-2V_3$$

$$-10-3+6V_3-V_3=0 \qquad V_2=2V_3-1$$

$$-13+5V_3=0$$

$$5V_3=13$$

$$V_3=\frac{13}{5}=2.6$$

~~$V_2=1-2\left(\frac{13}{5}\right)$~~

~~$=1-\frac{26}{5}$~~

$$V_2=2\left(\tfrac{13}{5}\right)-1$$

$$=\frac{26}{5}-\frac{5}{5}$$

$$=\frac{21}{5}=4.2$$

-0

-1 simple math error

-2 bigger math error or didn't get answers.

-3 concept error, still nodal analysis.

-4

-5 -all wrong.