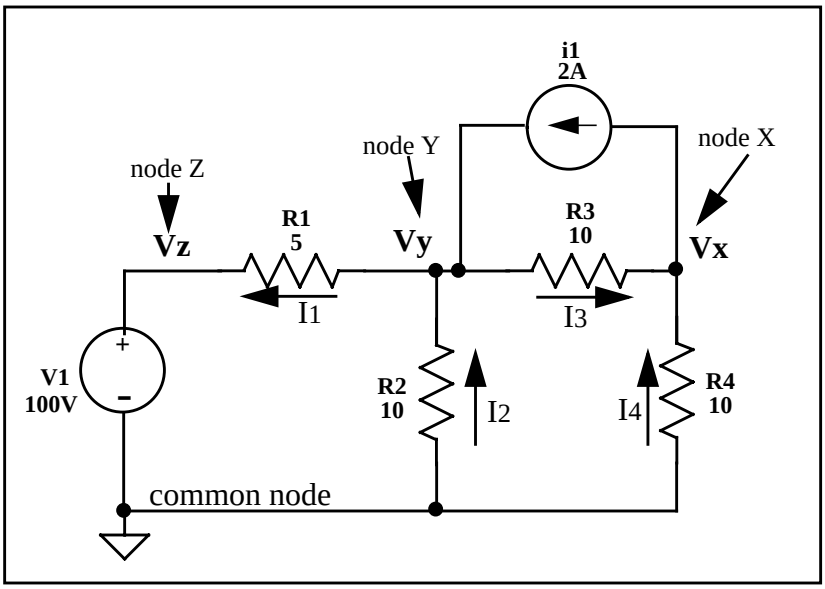
Using Spice for KCL Analysis

Below is a circuit analyzed by hand earlier. We shall now create a Spice netlist for this circuit and simulate it.



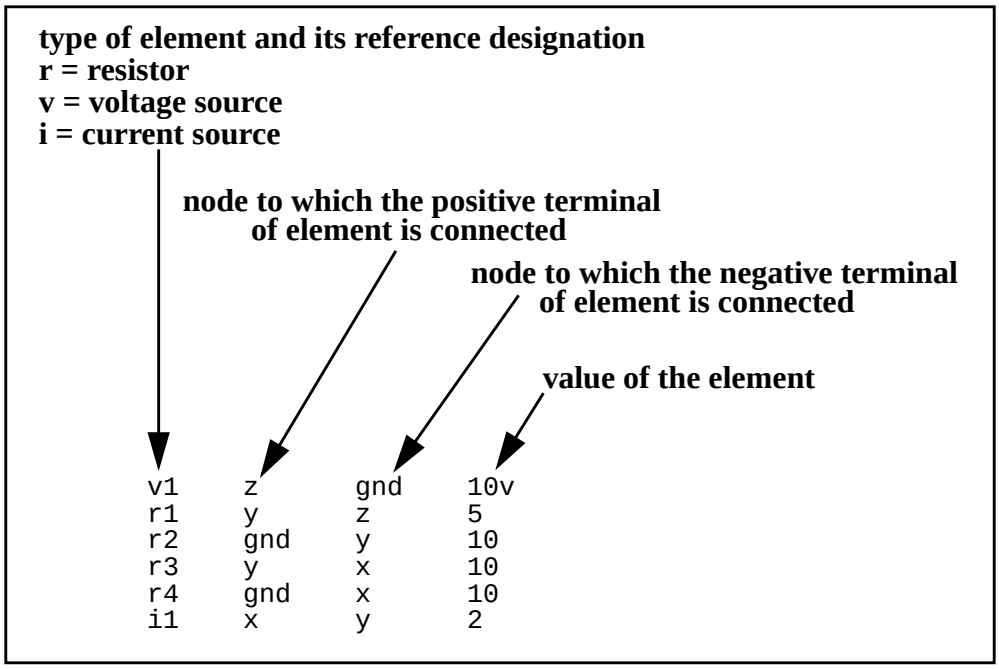
The Spice netlist for the circuit above is placed in a normal text file with whatever editor you like. It looks like this:

```
.title spice example for circuit kcl1.sp
.options
+ badchr=1  $detect bad chars
+ ingold=1  $combined exp and fixed output format
+ numdgt=4  $number of significant digits for output variables
$ netlist follows
v1    z      gnd   10v
r1    y      z     5
r2    gnd    y     10
r3    y      x     10
r4    gnd    x     10
i1    x      y     2
$ netlist done
.op $find dc operating point
.options post  $save data for post processing
.end
```

The `.options` line sets up some convenient settings for your simulation. The "+" is the continuation character for continuing the .options selections.

The body of the netlist is shown below. A review of its format is given below. Note that nodes

Vx, Vy, and Vz have been abbreviated x, y and z respectively.



Hspice is invoked on the file *kcl1.sp* at the unix prompt by typing:

```
hspice  kcl1.sp  >  output
```

The results from the simulation are in the file *output*:

```
****** operating point information tnom = 25.000 temp = 25.000
node    =  voltage    node    = voltage   node    = voltage
+0:x    =  -5.7143    0:y     = 8.5714    0:z     = 10.0000

****  voltage sources
subckt
element  0:v1
 volts     10.0000
 current   -0.2857
 power      2.8571

total voltage source power dissipation = 2.8571 watts

***** current sources
subckt
element  0:i1
 volts    -14.2857
 current    2.0000
 power     28.5714

total current source power dissipation = 28.5714 watts

**** resistors
```

Node voltages

Current is flowing out of “+” terminal of voltage source

```
subckt
element      0:r1       0:r2       0:r3       0:r4
 r value    5.0000    10.0000    10.0000    10.0000
 v drop    -1.4286    -8.5714    14.2857     5.7143
 current   -0.2857    -0.8571     1.4286     0.5714
 power      0.4082     7.3469    20.4082     3.2653
```

We see that the node voltages are identical to the hand calculated values. The dc operating point analysis also gives the voltage across, current through, and power.