

## Using Spice for KCL Analysis

Figure 1 is a circuit analyzed by hand earlier. We shall now create a Spice netlist for this circuit and simulate it.

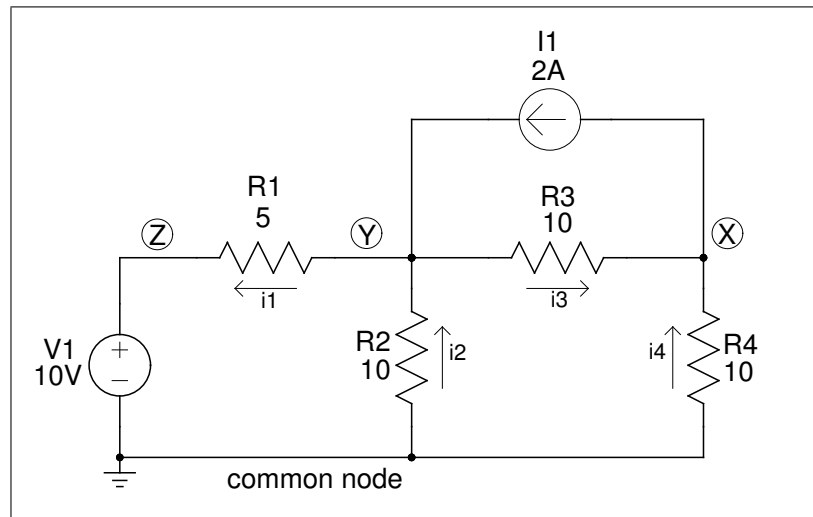


Figure 1: KCL Spice problem.

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

Listing 1: Spice file for KCL problem

```
.title class example problem (kcl)
***** netlist follows *****
v1      z      gnd      10
r1      y      z        5
r2      gnd    y        10
r3      y      x        10
r4      gnd    x        10
i1      x      y        2
***** netlist done *****
.control
    set numdgt=2
    op
    echo Node voltages:
    print line v(x) v(y) v(z)
    echo
    show vl
    quit
.endc
.end
```

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

Listing 2: Spice file for KCL problem

```
type of element and its reference designation
r = resistor
v = voltage source
i = current source
|
|           node which positive terminal of element is connected
|           |
|           |           node which negative terminal of element is connected
|           |           |
|           |           |           value of the element
|           |           |           |
v1          z           gnd          10
r1          y           z            5
r2          gnd         y            10
r3          y           x            10
r4          gnd         x            10
i1          x           y            2
```

Spice is invoked on the file `kc11.sp` at the Unix prompt by typing:

```
ngspice kc11.sp > output
```

The results from the simulation are in the file `output` as shown below.

Listing 3: Spice file for KCL problem

```
Circuit: class example problem (kc1)

Doing analysis at TEMP = 27.000000 and TNOM = 27.000000

No. of Data Rows : 1
node voltages:
v(x) = -5.7e+00
v(y) = 8.57e+00
v(z) = 1.00e+01

Vsource: Independent voltage source
  device          v1
  dc              10
  acmag           0
  pulse          -
  sine            -
  sin             -
  exp             -
```

```
    pw1      -
    sffm     -
    am       -
    trnoise  -
    trrandom -
    i        -0.285714
    p        2.85714
ngspice-2lplus done
```