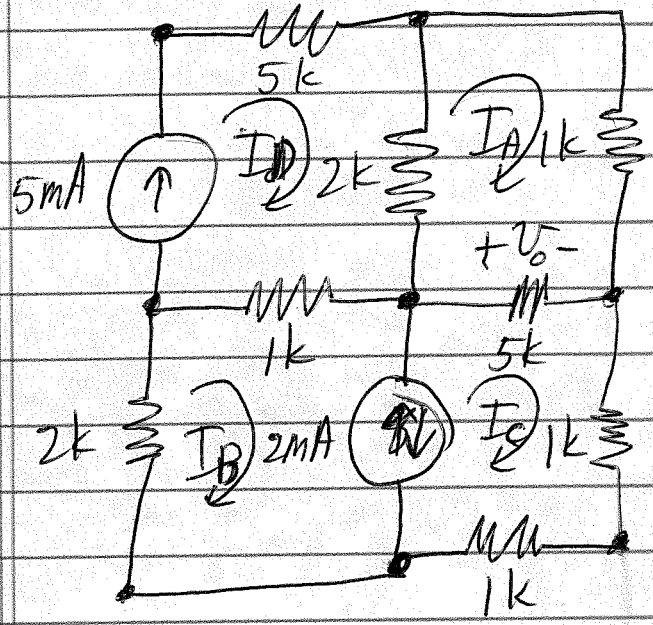
Example using SuperMesh:



Find v_o.

1.) We are asked to find a Voltage, so

why not use Node-Voltage Analysis?

Nodes: 7 - All unknown (no Vsrcs)

Meshes: 4 - but 1 Isrc is on edge so
1 Mesh Current is known,
so 3 Unknowns.

I'd pick Mesh Current Analysis: (Label) $I_D = 5m$

2.) $v_o = 5k(I_C - I_A)$ so we need to find I_A & I_C

3.) One I src between ~~two~~ Meshes B & C,

so we must use a Supermesh

$2mA = I_B - I_C$ times $1k\Omega$: $1kI_B - 1kI_C = 2V$

4.) (A) $1kI_A + 5k(I_A - I_C) + 2k(I_A - I_B) = 0$

$8kI_A + 0I_B - 5kI_C - 2k(5mA) = 0$

$8kI_A + 0I_B - 5kI_C = 10V$

(B+C) $1k(I_B - I_D) + 5k(I_C - I_A) + 1k(I_C) + 1k(I_C) + 2k(I_B) = 0$

$-5kI_A + 3kI_B + 7kI_C - 1k(5mA) = 0$

$-5kI_A + 3kI_B + 7kI_C = 5V$

3 Equations, 3 Unknowns

$$\begin{pmatrix} 8k & 0 & -5k \\ -5k & 3k & 7k \\ 0 & 1k & -1k \end{pmatrix} \begin{pmatrix} I_A \\ I_B \\ I_C \end{pmatrix} = \begin{pmatrix} 10V \\ 5V \\ 2V \end{pmatrix}$$

would be
~~(-5k)(-1k)~~ $(-5k)(-1k)-0(7k)$

$$\Delta = 8k[(3k)(-1k)-(1k)(7k)] - 0[\text{doesn't matter}] + (-5k)[(-5k)(1k)-(0)(3k)]$$

$$= 8k[-3k^2-7k^2] - 0 + (-5k)[-5k^2-0]$$

$$= -80k^3 + 25k^3 = -55k^3$$

$$\Delta_A = \begin{vmatrix} 10V & 0 & -5k \\ 5V & 3k & 7k \\ 2V & 1k & -1k \end{vmatrix}$$

$$= (10V)[(3k)(-1k)-(1k)(7k)] - (0)[\quad] + (-5k)[(5kV)(1k)-(2V)(3k)]$$

$$= 10V[-3k^2-7k^2] - 0 - 5k[5kV-6kV]$$

$$= -100kV + 5kV = -95kV$$

$$I_A = \frac{-95kV}{-55k^3} = 1.727\,mA$$

$$\Delta_C = \begin{vmatrix} 8k & 0 & 10V \\ -5k & 3k & 5V \\ 0 & 1k & 2V \end{vmatrix} = (8k)[(3k)(2V)-(1k)(5V)] - (0)[\quad] + 10V[(-5k)(1k)-0]$$

$$= 8k[6kV-5kV] + 10V[-5k^2] = 8k^2V - 50k^2V = -42k^2$$

$$I_C = \frac{-42k^2V}{-55k^3} = 0.764\,mA$$

So $v_o = 5k\Omega(I_c - I_b)$

$= 5k\Omega(0.764 - 1.727)mA$

$v_o = 5k\Omega(-.963\ mA) = -4.815\ V$

I did this on paper, then I used CircuitLab to simulate it, and got different result!! Then I put my matrix in Excel and calculated the determinant, and got different result!! Discovered a sign error in my original calculation, fixed it, and everything worked out. I tell you this to point out that we all make mistakes, the important thing is to recognize the possibility and

not to be paralyzed by fear or indecision, but to look for ways to check and verify at every step you can. When you can, take every chance to confirm your results. Be willing not to just accept that you made a mistake, but to find and correct the error!

Good summary of Mesh-Current Analysis on p. 100 of text.