**Brute Force 1 Example**

> *restart*

**Element Equations**

> $OhmR1 := v1 = i1 \cdot R1$

$$OhmR1 := v1 = i1\,R1 \tag{1}$$

> $OhmR2 := v2 = i2 \cdot R2$

$$OhmR2 := v2 = i2\,R2 \tag{2}$$

**KCL Equations (Third one not used)**

> $KCLna := -ia + i1 + i2 = 0$

$$KCLna := -ia + i1 + i2 = 0 \tag{3}$$

> $KCLnb := -i2 + ib = 0$

$$KCLnb := -i2 + ib = 0 \tag{4}$$

> $KCLnc := ia - i1 - ib = 0$

$$KCLnc := ia - i1 - ib = 0 \tag{5}$$

**KVL Equations**

> $KVLl1 := -va + v1 = 0$

$$KVLl1 := -va + v1 = 0 \tag{6}$$

> $KVLl2 := -v1 + v2 + vb = 0$

$$KVLl2 := -v1 + v2 + vb = 0 \tag{7}$$

**Symbolically Solve**

> $MySoln := simplify(expand(solve(\{OhmR1, OhmR2, KCLna, KCLnb, KCLnc, KVLl1, KVLl2\}, [i1, i2, ib, v1, v2, va])))$

$$MySoln := \left[\left[ i1 = \frac{R2\,ia + vb}{R1 + R2},\ i2 = \frac{R1\,ia - vb}{R1 + R2},\ ib = \frac{R1\,ia - vb}{R1 + R2},\ v1 \right.\right. \tag{8}$$

$$\left.\left. = \frac{R1\,(R2\,ia + vb)}{R1 + R2},\ v2 = \frac{R2\,(R1\,ia - vb)}{R1 + R2},\ va = \frac{R1\,(R2\,ia + vb)}{R1 + R2} \right]\right]$$

**Define and Substitute Numerical Values**

> $Vals := R1 = 1000, R2 = 2.2e3, ia = 5e-3, vb = 12$

$$Vals := R1 = 1000,\ R2 = 2200.,\ ia = 0.005,\ vb = 12 \tag{9}$$

> $MyNumSoln := subs(Vals, MySoln)$

$$MyNumSoln := [[ i1 = 0.007187500000,\ i2 = -0.002187500000,\ ib = \tag{10}$$

$$-0.002187500000,\ v1 = 7.187500000,\ v2 = -4.812500000,\ va$$

$$= 7.187500000]]$$

**Define Auxiliary Equations**

> $AuxEqn := [pdelia = va \cdot ia, pdelvb = -vb \cdot ib, pabsR1 = v1 \cdot i1, pabsR2 = v2 \cdot i2, ]$

$$AuxEqn := [pdelia = va\,ia,\ pdelvb = -vb\,ib,\ pabsR1 = v1\,i1,\ pabsR2 = v2\,i2] \tag{11}$$

**Substitute in Symbolic Solutions to Auxiliary Variables**

> $MyFinalAnswer := subs(MySoln[1][\ ], AuxEqn)$

$$MyFinalAnswer := \left[ pdelia = \frac{R1\,(R2\,ia + vb)\,ia}{R1 + R2},\ pdelvb = -\frac{vb\,(R1\,ia - vb)}{R1 + R2}, \right. \tag{12}$$

$$pabsR1 = \frac{R1\,(R2\,ia + vb)^2}{(R1 + R2)^2}, \; pabsR2 = \frac{R2\,(R1\,ia - vb)^2}{(R1 + R2)^2} \Big]$$

**Substitute in Symbolic Solutions then Numerical Values to Auxiliary Variables**

> $MyFinalNumAnswer := subs(MySoln[1][\;], Vals, AuxEqn)$

$MyFinalNumAnswer := [pdelia = 0.03593750000, pdelvb = 0.02625000000,$     **(13)**

    $pabsR1 = 0.05166015625, pabsR2 = 0.01052734375]$

>