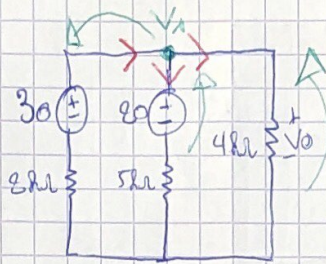


Methode des Nodens

1)



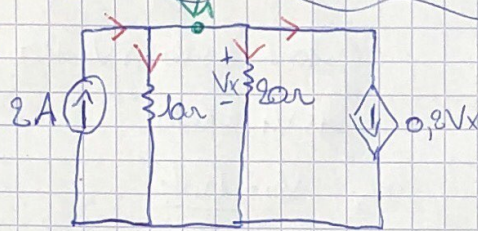
$$\frac{30 - V_1}{2} = \frac{V_1 - 20}{5} + \frac{V_1}{4}$$

$$300 - 10V_1 = 4V_1 - 80 + 5V_1$$

$$-19V_1 = -380$$

$$V_1 = \frac{380}{19} = 20V$$

2)



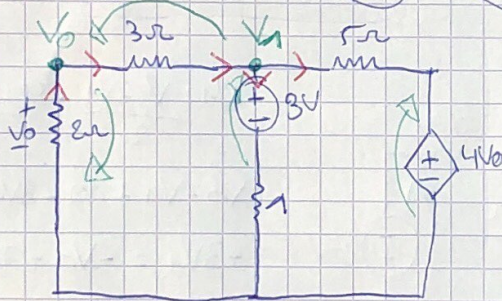
$$2 = \frac{V_1}{10} + \frac{V_1}{20} + 0.2V_1$$

$$40 = 2V_1 + V_1 + 4V_1$$

$$40 = 7V_1$$

$$V_1 = \frac{40}{7} = 5.71V$$

3)



$$N1: -\frac{V_0}{2} = \frac{V_0 - V_1}{3}$$

$$-3V_0 = 2V_0 - 2V_1$$

$$-5V_0 = -2V_1$$

$$V_0 = \frac{2V_1}{5}$$

$$N2: \frac{V_0 - V_1}{3} = \frac{V_1 - 3}{1} + \frac{V_1 - 4V_0}{5}$$

$$5V_0 - 5V_1 = 15V_1 - 45 + 3V_1 - 16V_0$$

$$-23V_1 = -17V_0 - 45$$

$$V_1 = \frac{17V_0 + 45}{23}$$

$$V_1 = \frac{17(2V_1) + 225}{115}$$

$$115V_1 = 34V_1 + 225$$

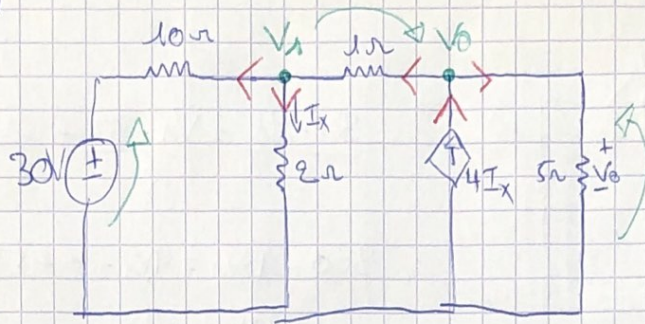
$$V_1 = \frac{225}{81} = \frac{25}{9} = 2.77V$$

$$V_0 = \frac{2 \cdot \frac{25}{9}}{5}$$

$$45V_0 = 50$$

$$V_0 = \frac{50}{45} = 1.11V$$

4)



$$N1: \frac{V_0 - V_1}{1} = \frac{V_1}{2} + \frac{V_1 - 30}{10}$$

$$10V_0 - 10V_1 = 5V_1 + V_1 - 30$$

$$-16V_1 = -10V_0 - 30$$

$$V_1 = \frac{10V_0 + 30}{16}$$

$$N2: 2V_1 = \frac{V_0 - V_1}{1} + \frac{V_0}{5}$$

$$10V_1 = 5V_0 - 5V_1 + V_0$$

$$15V_1 = 6V_0$$

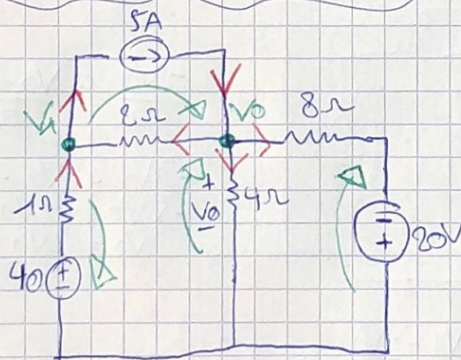
$$V_0 = \frac{15V_1}{6}$$

~~V0~~

$$V_0 = \frac{15(10V_0 + 30)}{96} \Rightarrow 96V_0 = 150V_0 + 450 \Rightarrow -54V_0 = 450$$

$$V_0 = \frac{-450}{54} = -8,33V$$

5)



$$N1: \frac{V_0 - V_1}{2} + \frac{40 - V_1}{1} = 5$$

$$V_0 - V_1 + 80 - 2V_1 = 10$$

$$-3V_1 = -V_0 - 70$$

$$V_1 = \frac{V_0 + 70}{3}$$

$$N2: 5 = \frac{V_0 - V_1}{2} + \frac{V_0}{4} + \frac{V_0 + 20}{8}$$

$$40 = 4V_0 - 4V_1 + 2V_0 + V_0 + 20$$

$$40 = 7V_0 - 4V_1 + 20$$

$$-7V_0 = -4V_1 - 20$$

$$V_0 = \frac{4V_1 + 20}{7}$$

$$V_0 = \frac{4(V_0 + 70) + 60}{21}$$

$$21V_0 = 4V_0 + 340$$

$$17V_0 = 340$$

$$V_0 = \frac{340}{17} = 20V$$