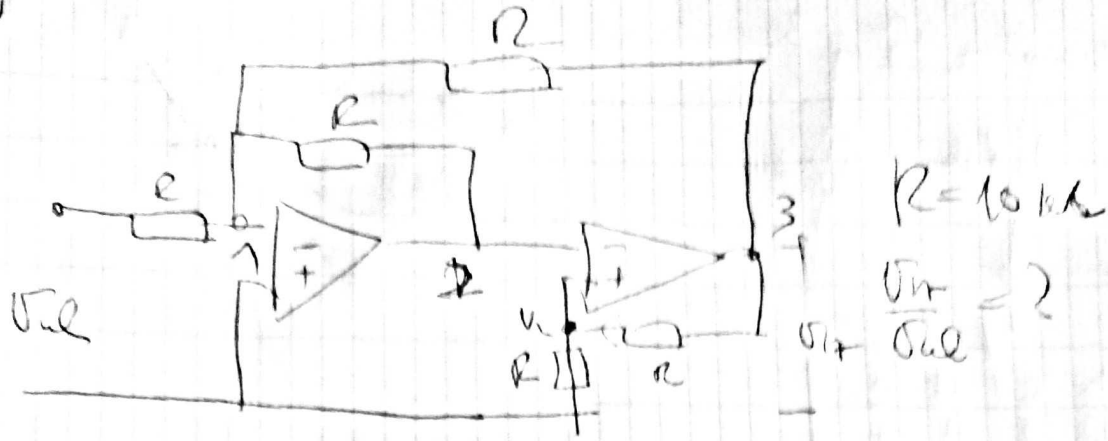


G3.
1



$V_1 = 0$

$$\frac{3}{R} V_1 - \frac{1}{R} V_2 - \frac{1}{R} V_3 = \frac{u_{in}}{R} \quad (1)$$

$$V_2 = \frac{u_{out}}{2} = \frac{V_3}{2}$$

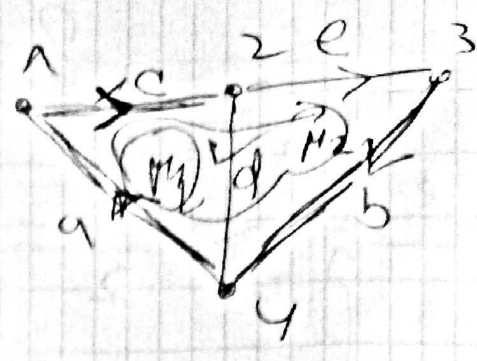
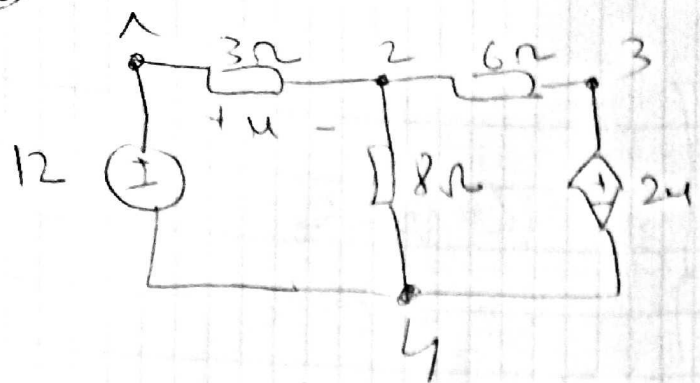
$$u_{out} = V_3$$

$$\Rightarrow -\frac{1}{R} \cdot \frac{V_3}{2} - \frac{1}{R} V_3 = \frac{u_{in}}{R} \quad | \cdot 2R$$

$$= -V_3 - 2V_3 = 2u_{in}$$

$$= -3V_3 = 2u_{in} \Rightarrow \boxed{\frac{u_{out}}{u_{in}} = -\frac{3}{2}}$$

2)



$$B_f = \left[\begin{array}{ccc|cc} a & b & c & d & e \\ 1 & 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 0 & 1 \end{array} \right]$$

$$\begin{bmatrix} i_a \\ i_b \\ i_c \\ i_d \\ i_e \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \\ 1 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} i_d \\ i_e \end{bmatrix} \Rightarrow \begin{aligned} i_a &= i_d + i_e \\ i_b &= i_e \\ i_c &= i_d + i_e \\ \hline i_a &= i_c \end{aligned}$$

P_1

$$12 - 3i_c - 8i_d = 0$$

$$12 - 3(i_d + i_e) - 8i_d = 0$$

$$3i_e = 12 - 11i_d \Rightarrow i_e = \frac{12 - 11i_d}{3}$$

P_2

$$2u + 6i_e - 8i_d = 0$$

$$2 \cdot 3i_c + 6i_e - 8i_d = 0$$

$$6 \cdot (i_d + i_e) + 6i_e - 8i_d = 0$$

$$-2i_d + 12i_e = 0$$

$$-2i_d + 4(12 - 11i_d) = 0 \Rightarrow$$

$$\Rightarrow -46i_d = -48$$

$$i_d = 1,04 \text{ A} \quad i_e = 1,215$$

$$i_c = 2,255 \text{ A} \quad u = 3 \cdot i_c \approx 3,65 \text{ V}$$

3) Kgo G_1 , cymho

4. a) kas kas G_1 u G_2

b) $I_{sv} = \frac{2}{3} A$