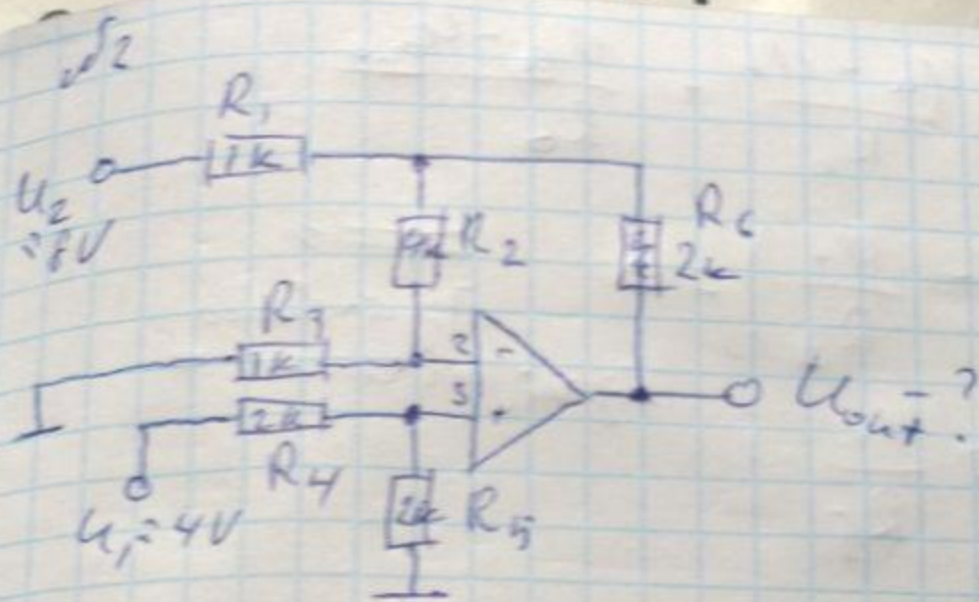
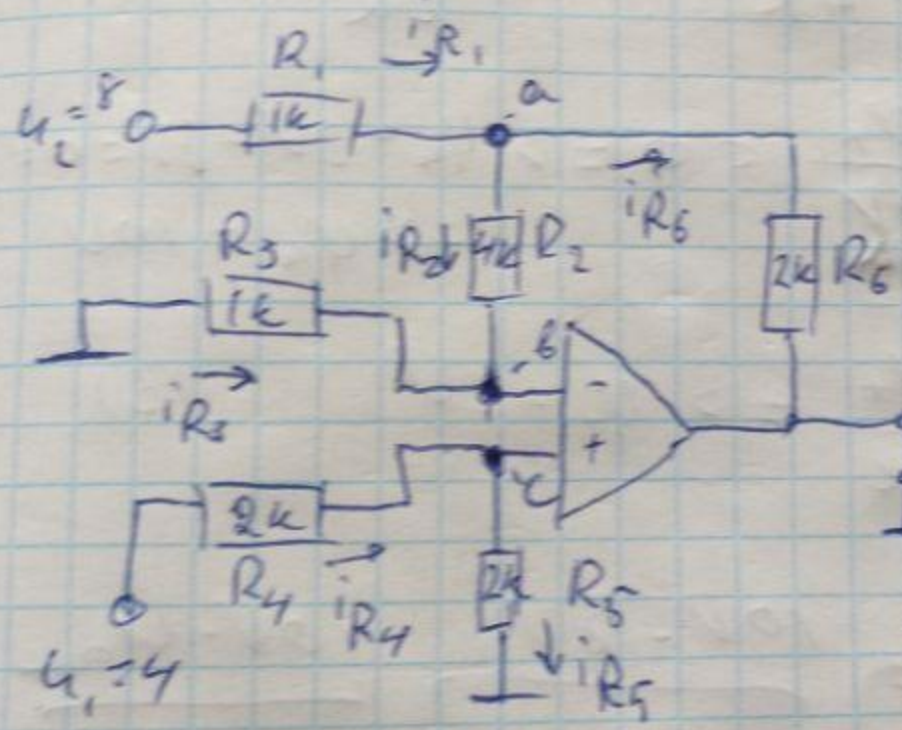




Дано:
 $U_1 = 4V$
 $U_2 = 8V$
 $U_{out} = ?$

Решим задачу методом узловых потенциалов и с помощью закона Кирхгофа:



$\varphi_+ = \varphi_-$
 Запишем 1.3.к. для узлов:

а: $i_{R1} = i_{R2} + i_{R6}$
 б: $i_{R2} + i_{R3} = 0$
 в: $i_{R4} = i_{R5}$

$$i_{R1} = \frac{U_2 - \varphi_a}{R_1}; \quad i_{R2} = \frac{\varphi_a - \varphi_-}{R_2}; \quad i_{R3} = \frac{\varphi_- - \varphi_-}{R_3}$$

$$i_{R4} = \frac{U_1 - \varphi_+}{R_4}; \quad i_{R5} = \frac{\varphi_+ - 0}{R_5}; \quad i_{R6} = \frac{\varphi_a - U_{out}}{R_6}$$

Подставим значения сопротивлений и найдем по 1.3.к.:

Christmas

THE

$$\begin{cases} a: \frac{U_2 - U_a}{R_1} = \frac{U_a - U_+}{R_2} + \frac{U_a - U_{out}}{R_6} \\ b: \frac{U_a - U_+}{R_2} + \left(-\frac{U_+}{R_3}\right) = 0 \\ c: \frac{U_1 - U_+}{R_4} = \frac{U_+}{R_5} \end{cases}$$

Nichtlinear
Nichtlinear

①

$$\frac{8V - U_a}{1k} = \frac{U_a - U_+}{4k} + \frac{U_a - U_{out}}{2k} \quad (1)$$

$$\frac{U_a - U_+}{4k} - \frac{U_+}{4k} = 0 \Rightarrow U_a - 2V - 8V = 0 \Rightarrow U_a = 10V \quad (2)$$

$$\frac{4V - U_+}{2k} = \frac{U_+}{2k} \Rightarrow U_+ = 2V \quad (3)$$

$$(1): \frac{8V - 2V}{1k} = \frac{10V - 2V}{4k} + \frac{10V - U_{out}}{2k} \Rightarrow$$

$$\Rightarrow 24V = 8V + 20V - 2U_{out} \Rightarrow$$

$$\Rightarrow \boxed{U_{out} = 2V}$$