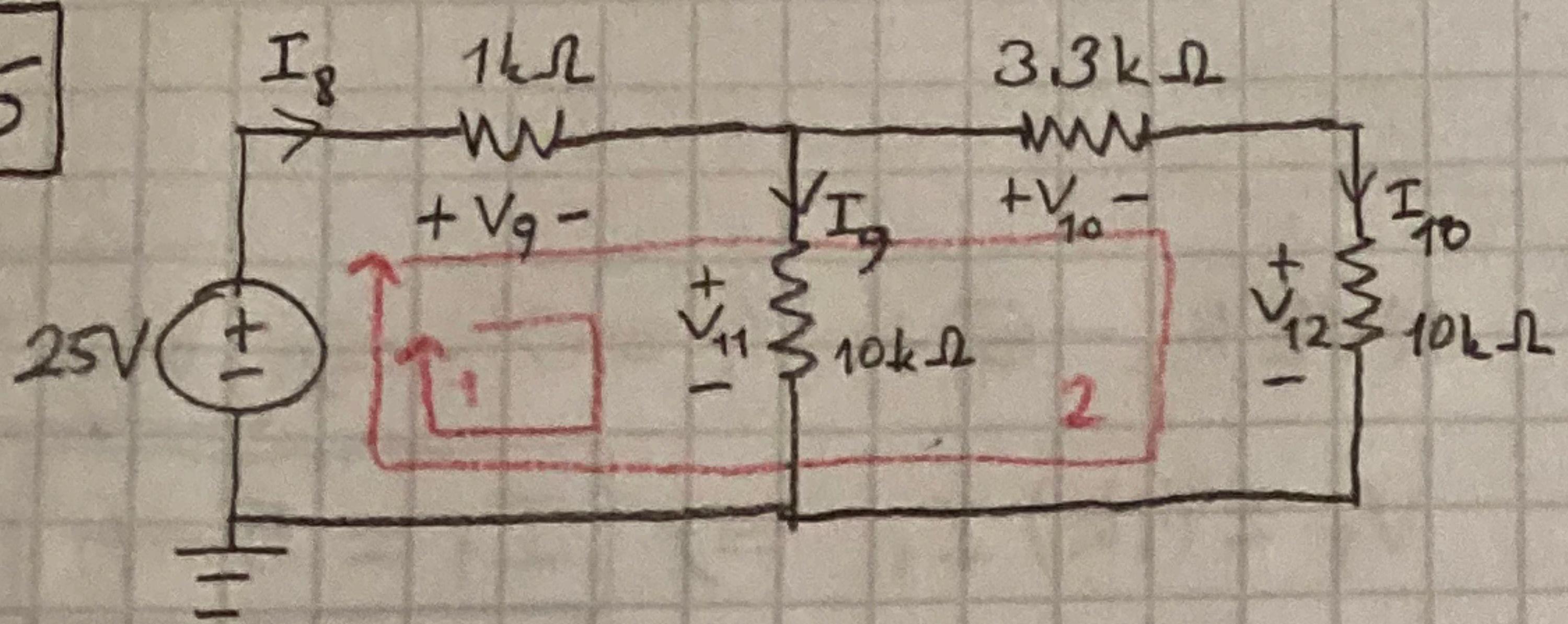


1.5



$$KCL: I_8 = I_9 + I_{10}, \quad KVL 1: -25 + (1k)I_8 + (10k)I_9 = 0$$

$$KVL 2: -25 + (1k)I_8 + (3.3k)I_{10} + (10k)I_{10} = 0$$

$$\Rightarrow 10I_9 = 13.3I_{10}, \quad I_9 = 1.33I_{10} \Rightarrow I_8 = 2.33I_{10}$$

$$\Rightarrow -25 + (1k)2.33I_{10} + (13.3k)I_{10} = 0 \Rightarrow (15.63k)I_{10} = 25$$

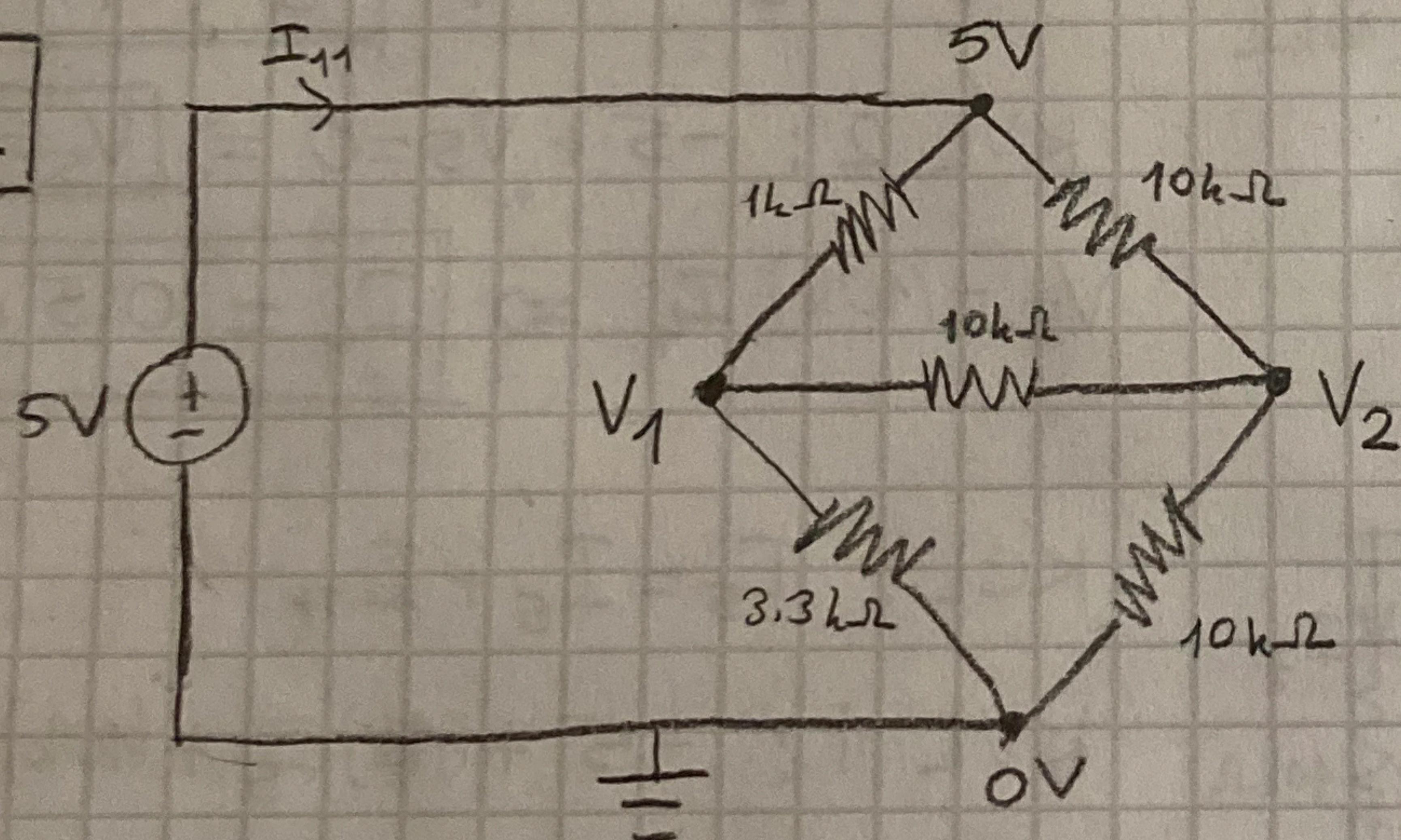
$$\Rightarrow I_{10} \approx 1.6 \text{ mA} \Rightarrow I_8 \approx 3.73 \text{ mA}$$

$$I_9 \approx 2.13 \text{ mA}$$

$$V_9 = (1k)I_8 = 3.73 \text{ V}, \quad V_{10} = (3.3k)I_{10} = 5.28 \text{ V}$$

$$V_{11} = (10k)I_9 = 21.3 \text{ V}, \quad V_{12} = (10k)I_{10} = 16 \text{ V}$$

2



$$KCL V_1: \frac{V_1 - 5}{1k} + \frac{V_1 - V_2}{10k} + \frac{V_1}{3.3k} = 0$$

$$KCL V_2: \frac{V_2 - 5}{10k} + \frac{V_2 - V_1}{10k} + \frac{V_2}{10k} = 0$$

$$\Rightarrow \frac{10V_1 - 50 + V_1 - V_2 + 3V_1}{10k} = 0 \quad (1)$$

$$\Rightarrow 14V_1 - V_2 = 50 \quad (1)$$

$$(2) \frac{V_2 - 5 + V_2 - V_1 + V_2}{10k} = 0 \Rightarrow -V_1 + 3V_2 = 5 \quad (2)$$

$$3 \cdot (1) + (2): 41V_1 = 155 \Rightarrow V_1 \approx 3.78 \text{ V}, \quad V_2 \approx 2.93 \text{ V}$$

$$I_{11} = \frac{5 - V_1}{1k} + \frac{5 - V_2}{10k} \approx 1.43 \text{ mA}$$

$$R_{ab} = \frac{5}{I_{11}} \approx 3.5 \text{ k}\Omega$$