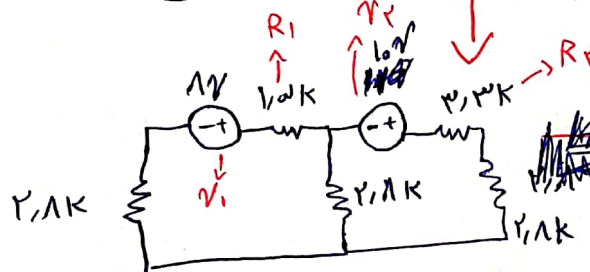
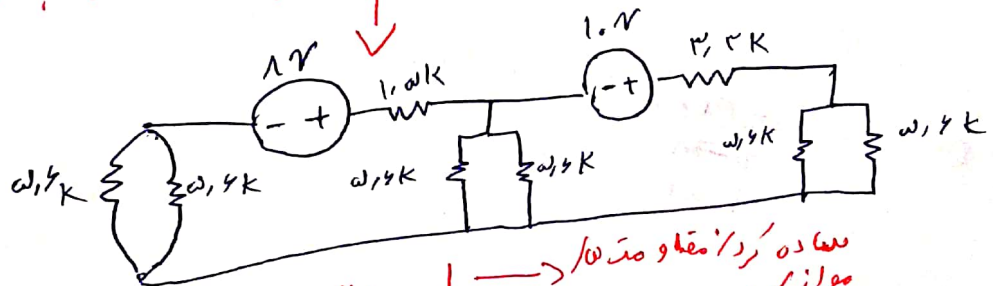
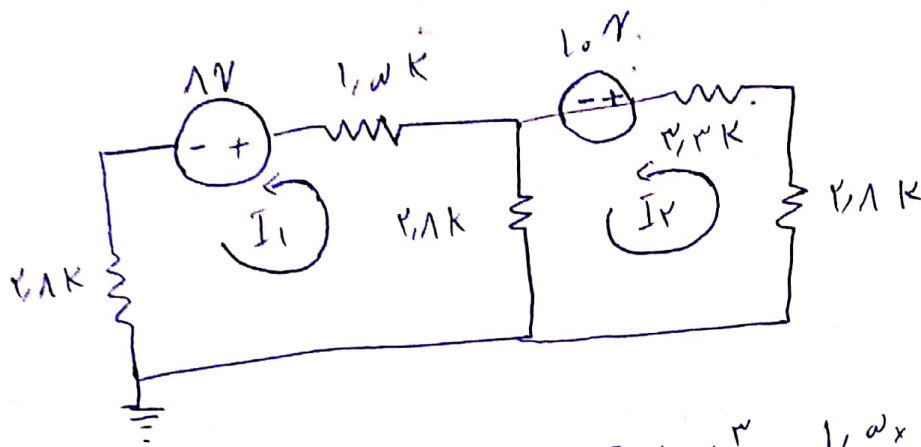


حذف  $R_9$  و  $R_{10}$  و اتصال سیم با لای به زمین  
 زمین در معادل با اتصال آن به سیم زمین



معادله برداشته و معادله موازی



$$I_1: 1 + 2.1k \times I_1 \times 10^{-3} + 2.1k \times (I_1 - I_2) \times 10^{-3} + 1.0k \times I_1 \times 10^{-3} = 0$$

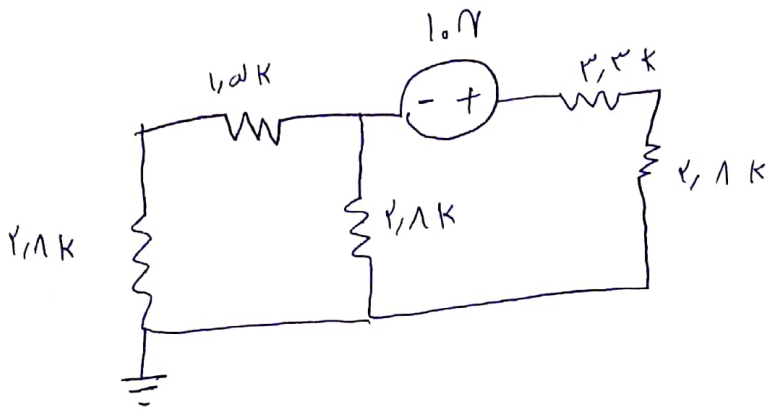
$$+ I_2: 1.0 + (I_2 - I_1) \times 2.1k \times 10^{-3} + 2.1k \times I_2 \times 10^{-3} + 2.2k \times I_2 \times 10^{-3} = 0$$

$$: 1 + 2.1k \times I_1 \times 10^{-3} + 1.0k \times I_1 \times 10^{-3} + 2.1k \times I_2 \times 10^{-3} + 2.2k \times I_2 \times 10^{-3} = 0$$

$$2.2k \times I_1 = -1k \times 10^{-3} - 2.1k \times I_2 \Rightarrow I_2 = \boxed{-\frac{2.2k I_1 + 1k \times 10^{-3}}{2.1}}$$

$$\Rightarrow I_1 = -1.69 \times 10^{-3} \Rightarrow \boxed{I_{R1} = 1.69 \text{ mA}}$$

$$\Rightarrow I_{R2} = \cancel{1.69} - I_2 = \cancel{1.69} \text{ mA} \Rightarrow V_{R2} = I_{R2} \times R_2 = 0.104 \text{ V}$$



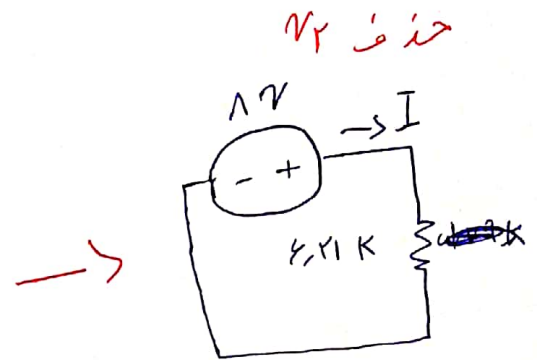
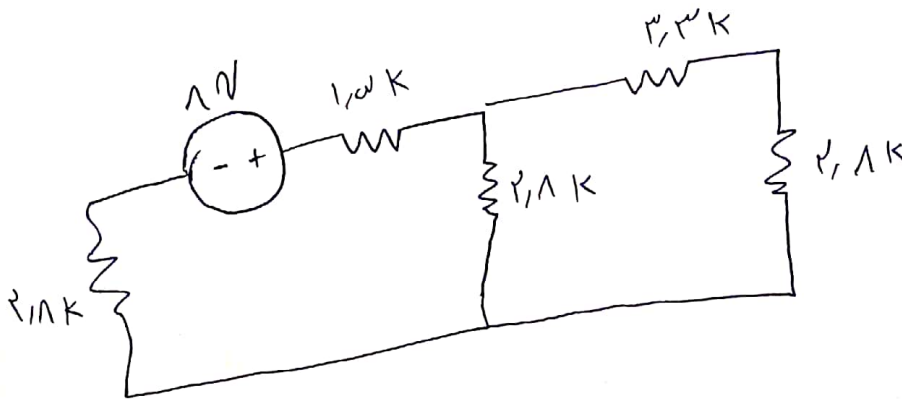
→

$$I = \frac{10}{1.1k} = 9.09 \text{ mA}$$

جواب  $I_1$

$$V_{R_1} = I_{R_1} \times R_1 = 9.09 \text{ V}$$

$$I_{R_1} = \frac{1}{1k + 10k + 1k} \times I = 0.0909 \text{ mA}$$



~~$I = \frac{10}{1.1k} = 9.09 \text{ mA}$~~

$$I_{R_1} = I = \frac{1}{1.1k + 1k} = 0.4545 \text{ mA}$$

$$I_{R_2} = \frac{1}{1k + 1k + 1k} \times I_{R_1} = 0.1515 \text{ mA}$$

$$\Rightarrow V_{R_2} = 1.515 \text{ V}$$

$$V_{R_2} = R_2 \times I_{R_2}$$