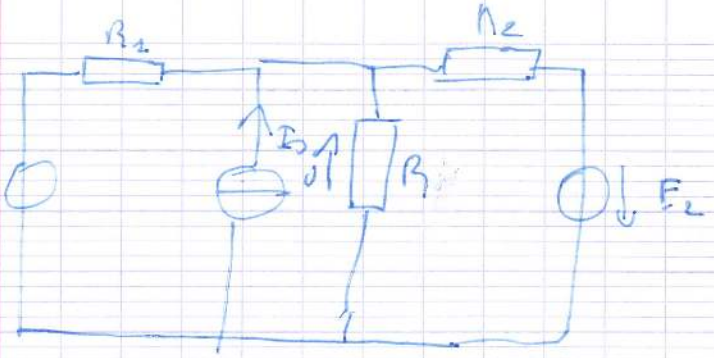
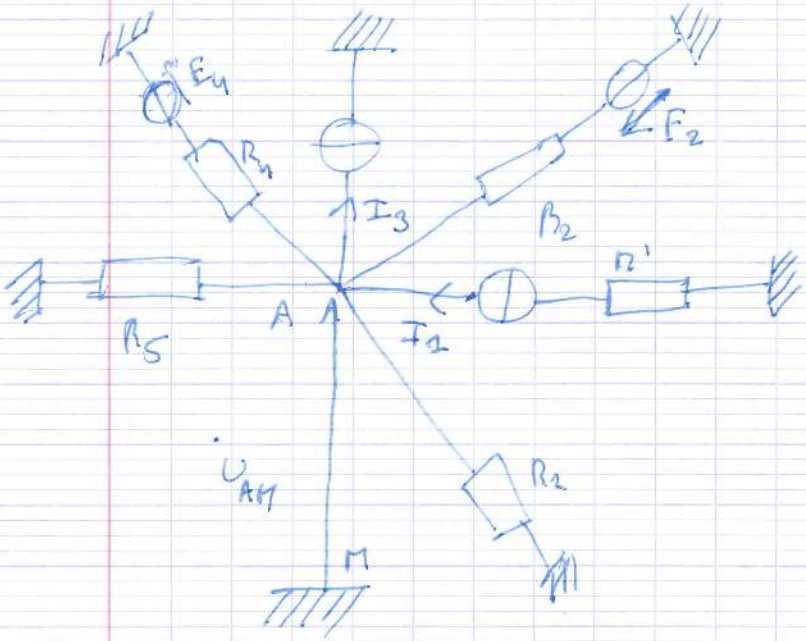
Electro

13/12

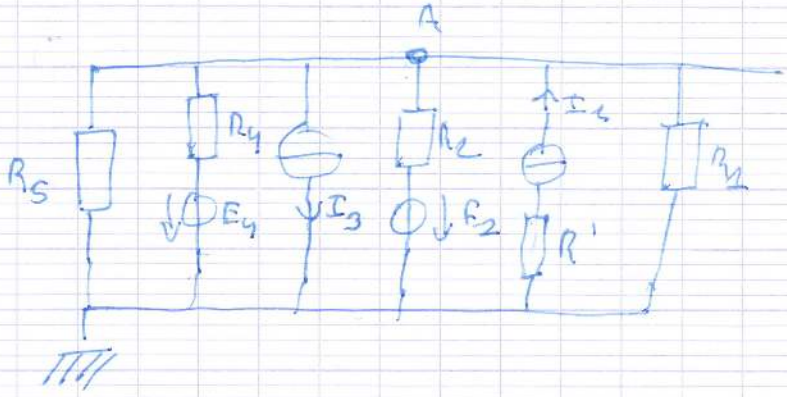



$$U = \frac{\frac{E_1}{R_1} + I_0 - \frac{E_2}{R_2}}{\frac{1}{R_1} + \frac{1}{R} + \frac{1}{R_2}}$$

Théorème de Millman



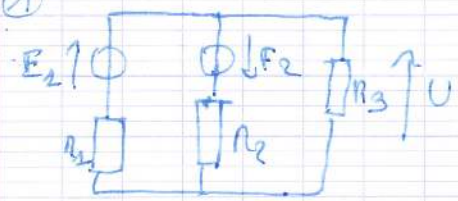

$$U = \frac{\sum_i \frac{E_i}{R_i} + \sum_i I_i}{\sum_k \frac{1}{R_k}}$$



Ex 1

Superposition

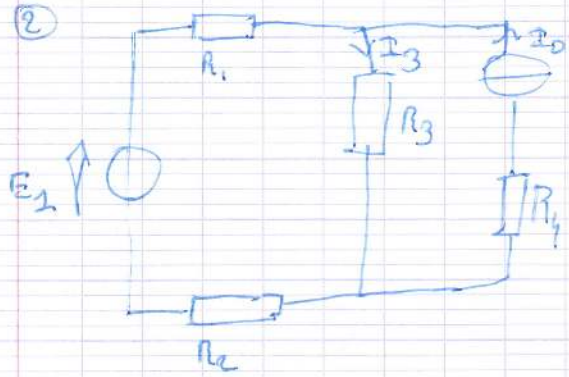
①




$$U_2 = \frac{\frac{E_1}{R_1} - \frac{E_2}{R_2}}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_c}}$$

$$U = \frac{E_1 R_2 R_c - E_2 R_1 R_c}{R_2 R_c + R_1 R_c + R_1 R_2}$$

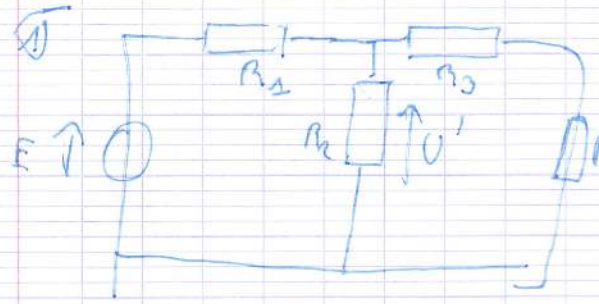
②




$$U_3 = \frac{\frac{E_1}{R_1 + R_2} + I_0}{\frac{1}{R_1 + R_2} + \frac{1}{R_3}}$$

Ex 2 :

①

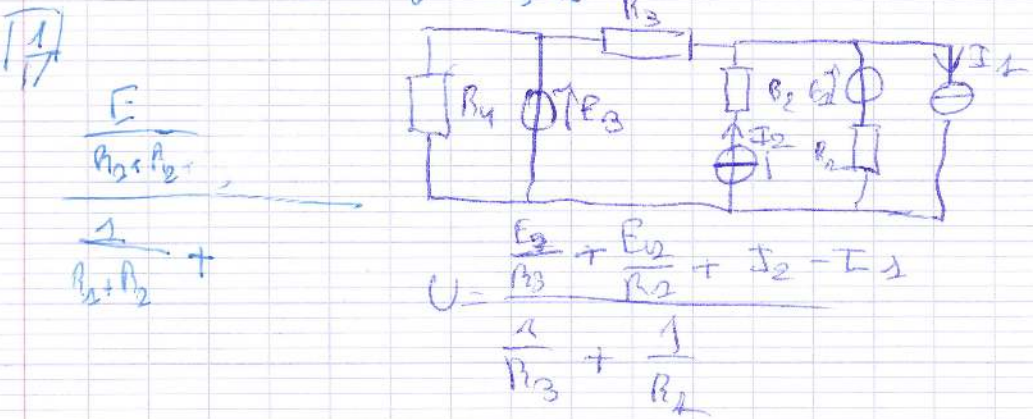



$$U' \times \frac{R_3 R_4}{R_3 + R_4}$$



$$U' = \frac{\frac{E_1}{R_1 + R_2} + \frac{E_2}{R_3}}{\frac{1}{R_1 + R_2} + \frac{1}{R_3} + \frac{1}{R_5 + R_c}}$$

Ex 5




$$U = \frac{\frac{E_3}{R_3} + \frac{E_{12}}{R_{12}} + I_2 - I_1}{\frac{1}{R_3} + \frac{1}{R_4}}$$

$$\frac{3R}{3R+R}$$

$$U = \frac{\frac{E_1}{R} + \frac{E_2}{R}}{\frac{1}{R} + \frac{1}{R} + \frac{1}{R}} = \frac{\frac{E_1+E_2}{R}}{\frac{3}{R}} = \frac{E_1+E_2}{3}$$

10 V

10 mA

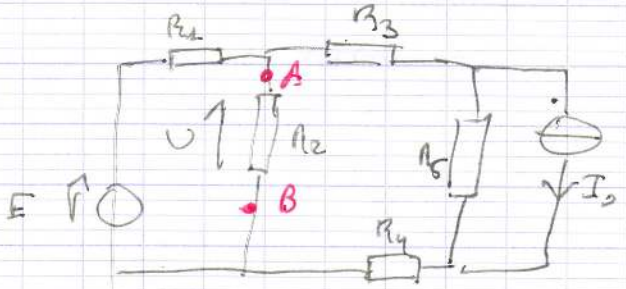
$R_2 = 3\,\Omega$

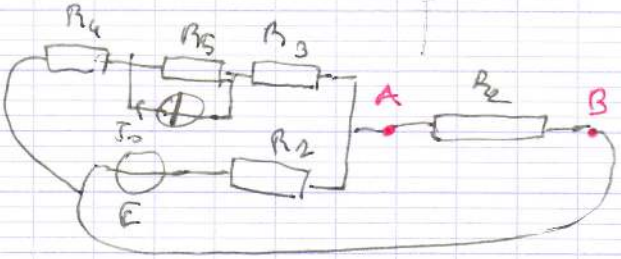
$R_3 = 1{,}2\,k\Omega$

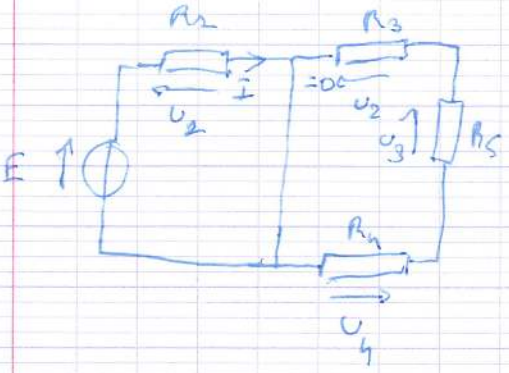
$R_4 = 500\,\Omega$

$R_5 = 1{,}5\,k\Omega$

$R_6 = 470\,\Omega$




$E - U_2 = 0$

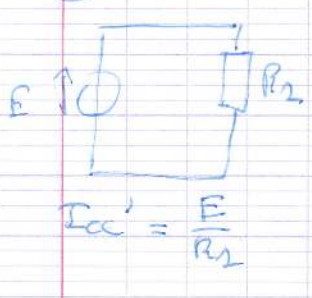
$U_2 = R_2 \times I_{cc}$

$E - R_2 I_{cc} = 0$

$I_{cc} = \frac{E}{R_2}$

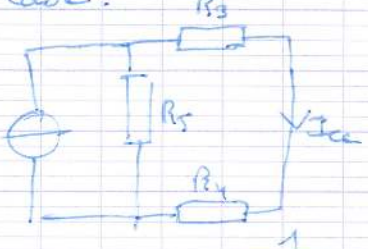
Norton

Cas 1 :




$I_{cc}' = \frac{E}{R_2}$

Cas 2 :

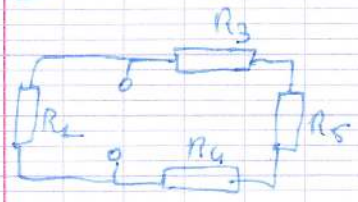



$$I_{cc}'' = -I_0 \times \frac{\frac{1}{R_3+R_4}}{\frac{1}{R_3+R_4} + \frac{1}{R_4}}$$

$$I_{cc}'' = -I_0 \times \frac{\frac{1}{R_3+R_4}}{\frac{R_3+R_4+R_3}{R_4(R_3+R_4)}}$$

$$I_{cc}'' = -I_0 \times \frac{R_4}{R_3+R_4+R_3}$$

E2




$$G_N = \frac{1}{R_3 + R_4 + R_5} + \frac{1}{R_2} = \frac{1}{R_N}$$

$$\frac{1}{R_N} = \frac{R_3 + R_3 + R_4 + R_5}{R_2 (R_3 + R_4 + R_5)}$$

$$R_N = \frac{R_2 (R_3 + R_4 + R_5)}{R_2 + R_3 + R_4 + R_5}$$

Ici $\frac{E}{R_1} - \frac{I_0 R_5}{R_3 + R_4 R_5} = I_N = 5\ mA$