Version 2

Correction CC1 étude d'une chaîne d'amplification

1. Calcul des résistances équivalentes

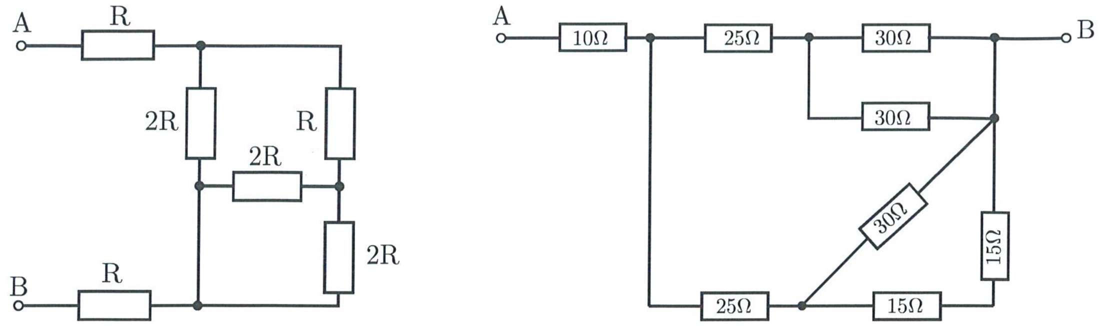


FIGURE 1 – Circuit 1A et circuit 1B

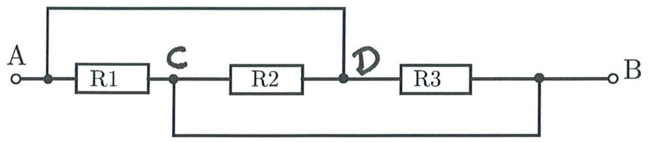
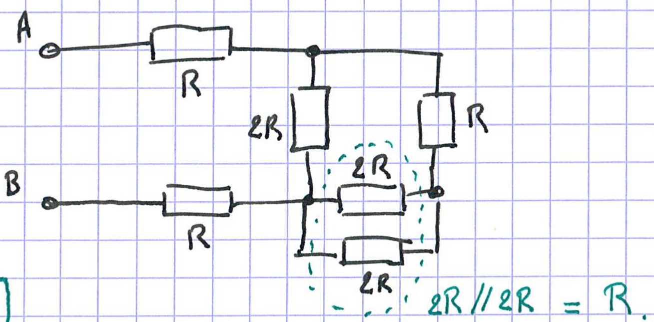


FIGURE 2 – Circuit 1C

Circuit 1A :



$$R_{eq_{AB}} = 3R$$

Circuit 1B

$$R_{eq_{AB}} = 10 + \left(\left((15+15) // 30 + 25\right) // \left((30//30) + 25\right)\right)$$

$$= 10 + (15 + 25) // (15 + 25)$$

$$= 10 + (40 // 40)$$

$$= 10 + 20 = 30$$

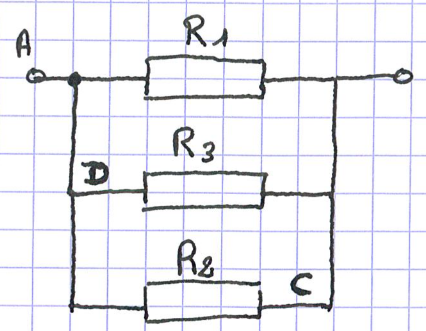
$$R_{eq_{AB}} = 30\,\Omega$$

Circuit 1C :

Potentiel C = B

D = A

le schéma peut se représenter sous la forme suivante



$\Rightarrow R_{eq_{AB}} = R_1 // R_2 // R_3$

2 Lois de Kirchhoff :

2.1 Circuit 2A

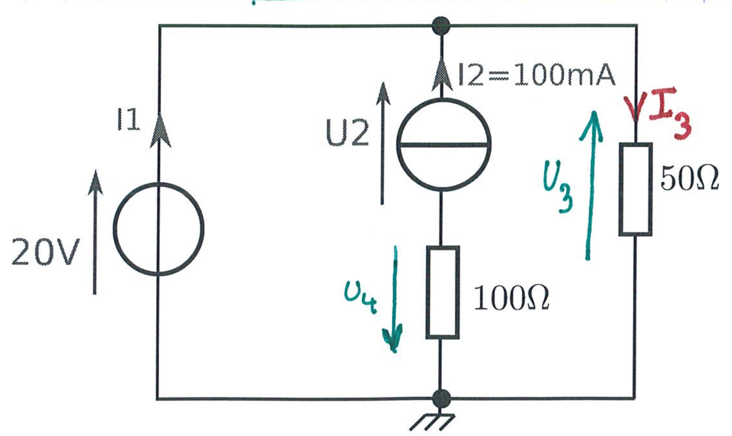


FIGURE 3 – Circuit 2A

1. $I_1 + I_2 = I_3$ ← loi des noeuds

$U_3 = 20V$ ← loi des mailles

$\rightarrow I_3 = \frac{U_3}{50\Omega} = \frac{20}{50}$ A A.N : $I_3 = 400$ mA

on en déduit $I_1 = I_3 - I_2$ $I_1 = 300$ mA

$-U_4 + U_2 - U_3 = 0$ loi des mailles

$\rightarrow U_2 = U_3 - U_4$ avec $U_4 = 100\Omega \times I_2$

$U_2 = 20V + 100mA \times 100 = 20 + 0{,}1 \times 100$

$U_2 = 30V$

2. La source de courant fournit une puissance

$P_{sc} = U_2 \times I_2 = 3W$

3. La convention générateur indique l'utilisation d'une source qui produit de la puissance

$P_{ST} = 20V . I_1 = 6W.$

2.2 Circuit 2B

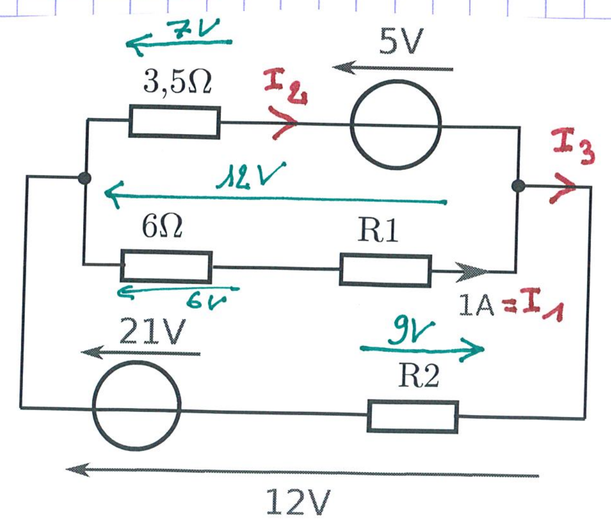


FIGURE 4 – Circuit 2B

$I_1 + I_2 = I_3$ loi des noeuds

$I_2 = \frac{7V}{3{,}5\Omega} = 2A.$

$\rightarrow I_3 = 3A$

D'après la loi des mailles, il faut 9V aux bornes de R_2

$9V = R_2 . I_3 \rightarrow R_2 = 3\Omega$

Aux bornes de la resistance de 6Ω nous avons 6V (loi d'Ohm) donc il est également nécessaire d'avoir 6V aux bornes de R_1 pour respecter les 12V aux bornes de la maille.

↳ $R_1 . I_1 = 6V \rightarrow R_1 = 6\Omega$

2.3 Circuit 3C

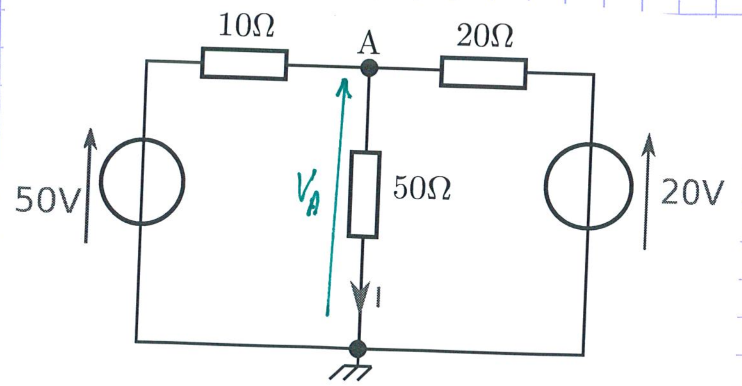


FIGURE 5 – Circuit 2C

Millman :

$$V_A = \frac{\frac{50V}{10\Omega} + \frac{20V}{20\Omega} + \frac{0V}{50\Omega}}{\frac{1}{10} + \frac{1}{20} + \frac{1}{50}} = \frac{6}{\frac{17}{100}} = 35{,}3V$$

$I = V_A/50 \rightarrow I = 0{,}71A$

3 Simplification de circuits.

Circuit 3A

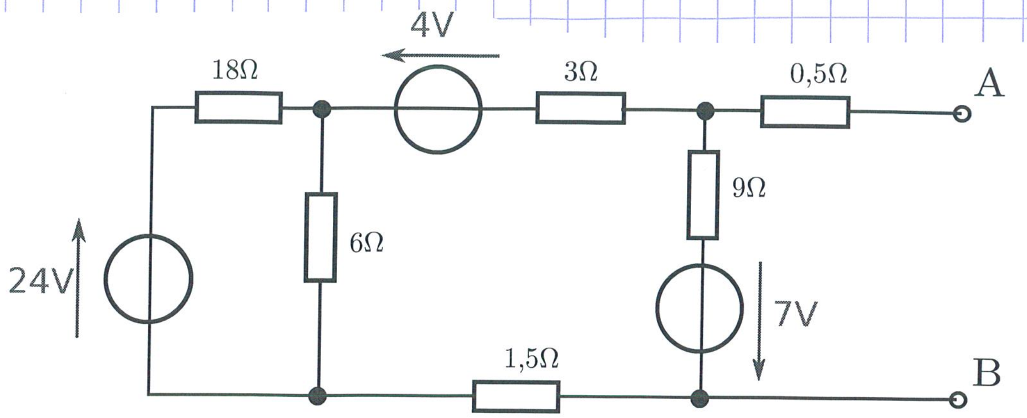
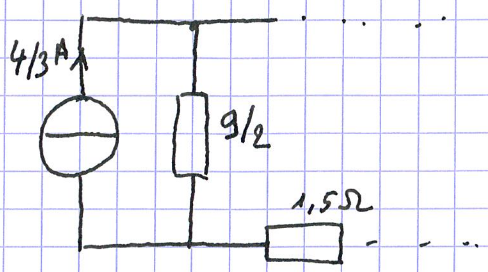
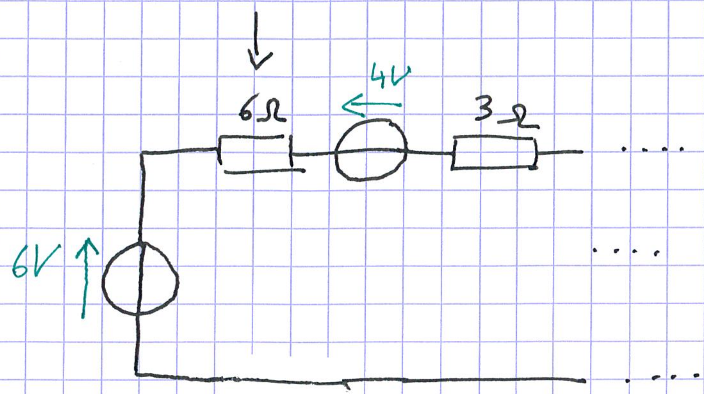
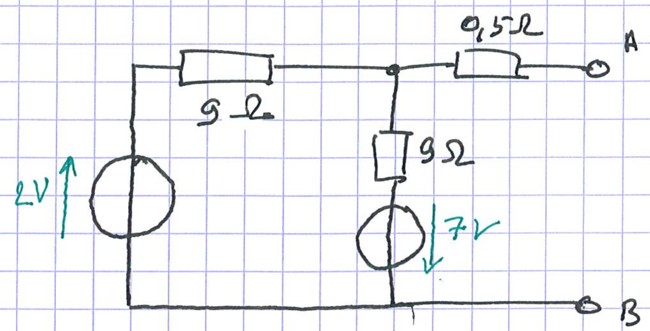
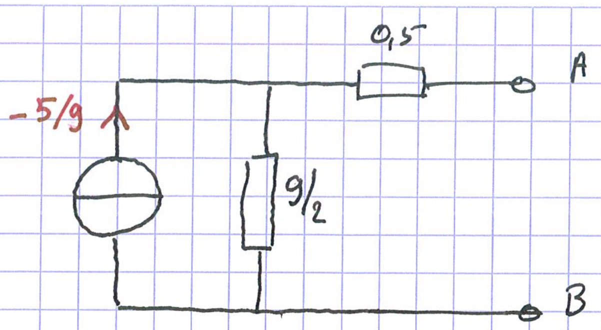


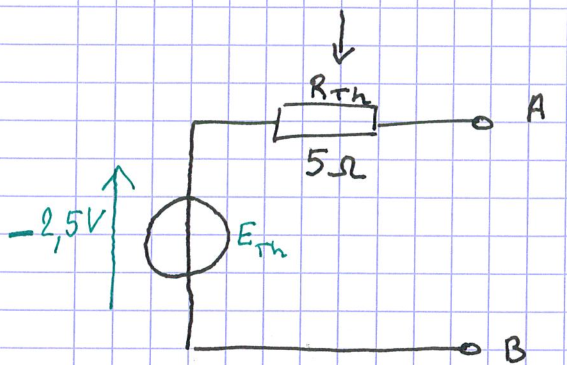
FIGURE 6 – Montage 3A











$E_{Th} = -2,5V$.
$R_{Th} = 5\Omega$.

Circuit 3B

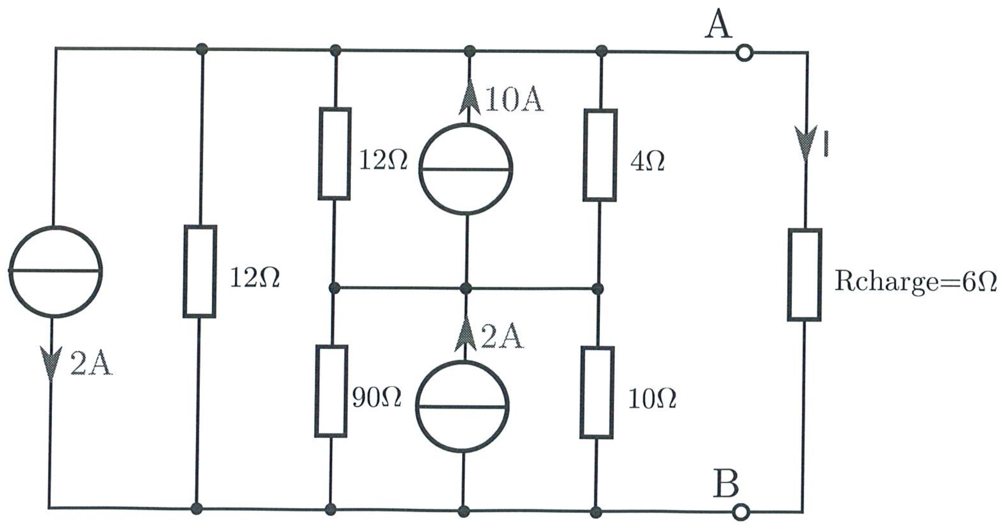
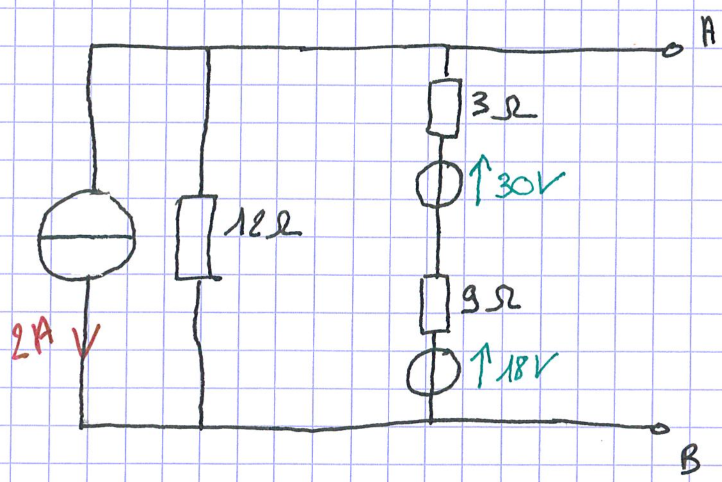
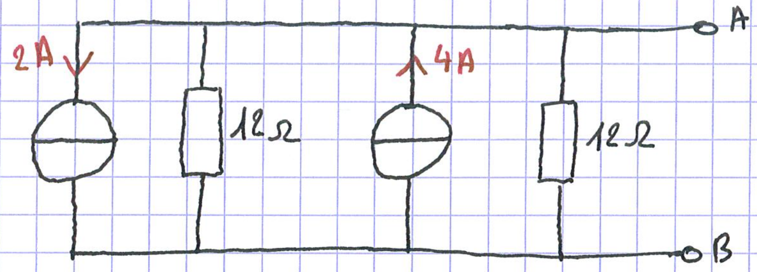
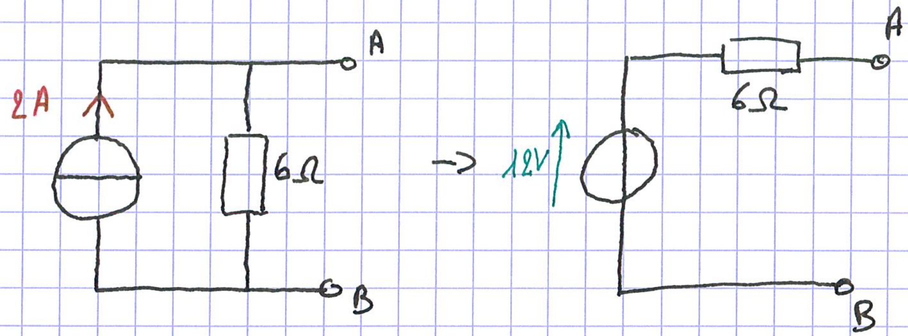


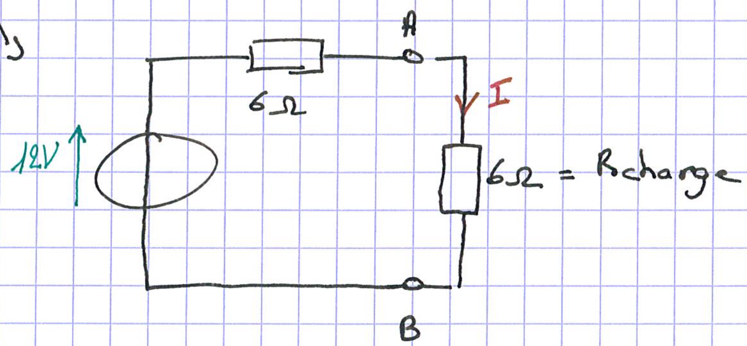
FIGURE 7 – Montage 3B







b)



$$I = \frac{12V}{6\Omega + 6\Omega} = 1A.$$

$$\boxed{I = 1A}$$