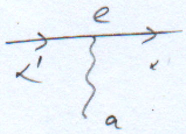
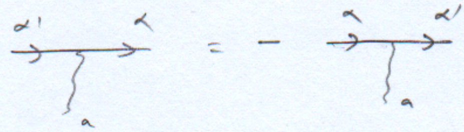
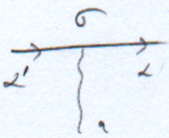
règles graphiques

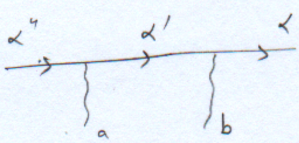
 $= T^{(e)a}_{\alpha\alpha'}$

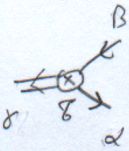
T antisymétrique :



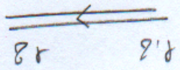
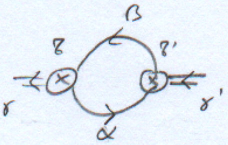
 $= T^{(\sigma)a}_{\alpha\alpha'}$

ainsi le produit s'effectue en remontant les flèches :

 $= T^{(e)a}_{\alpha\alpha'}\, T^{(e)b}_{\alpha'\alpha''}$

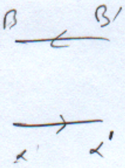
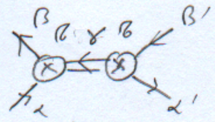
 $= \left(\mathcal{M}^{(\delta\gamma)}\right)_{\alpha\beta} =$ 

orthogonalité :

 $=$ 

$$\delta_{\delta\delta'}\,\delta_{\gamma\gamma'} = \sum_{\alpha,\beta} \left(\mathcal{M}^{(\delta\gamma)}\right)_{\alpha\beta} \left(\mathcal{M}^{(\delta'\gamma')}\right)_{\alpha\beta}$$

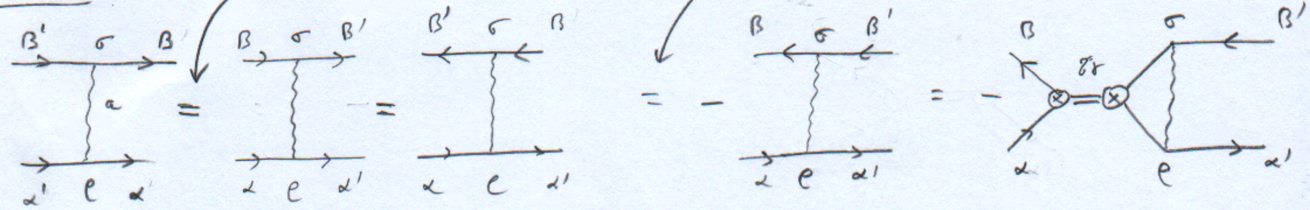
complétude :

 $=$ 

$$\delta_{\alpha\alpha'}\,\delta_{\beta\beta'} = \sum_{\delta,\gamma} \left(\mathcal{M}^{(\delta\gamma)}\right)_{\alpha\beta} \left(\mathcal{M}^{(\delta\gamma)}\right)_{\alpha'\beta'}$$

question 2 :

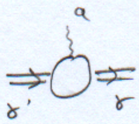
antisymétrie de $T^{(\sigma)a}$ et $T^{(e)a}$ antisymétrie de $T^{(\sigma)a}$



$$X_{\alpha\beta;\alpha'\beta'} = T^{(e)a}_{\alpha\alpha'}\, T^{(\sigma)a}_{\beta\beta'} = -\sum_{\delta\gamma} \left(\mathcal{M}^{(\delta\gamma)}\right)_{\alpha\beta} \left(T^{(e)a}\mathcal{M}^{(\delta\gamma)}\, T^{(\sigma)a}\right)_{\alpha'\beta'}$$

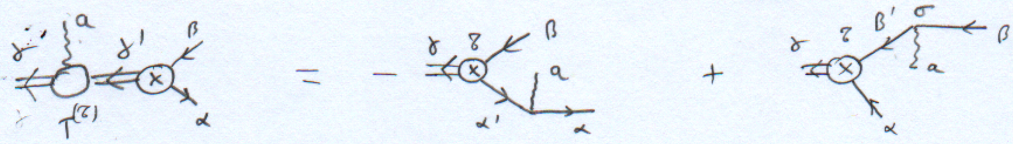
question 3

On introduit une notation graphique pour $T^{(\gamma)a}$:

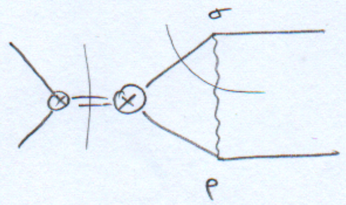
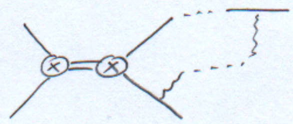
 $= T^{(\gamma)a}_{\gamma\gamma'}$

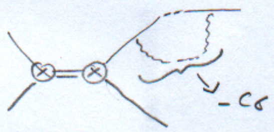
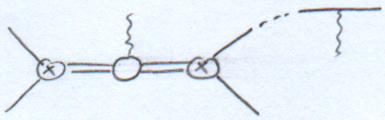
Alors $\sum_{\gamma'} T^{(\gamma)a}_{\gamma\gamma'} (\mathcal{M}^{(\gamma\gamma')})_{\alpha\beta} = -\sum_{\alpha'} T^{(\rho)a}_{\alpha\alpha'} (\mathcal{M}^{(\gamma\gamma)})_{\alpha'\beta} + \sum_{\beta'} (\mathcal{M}^{(\gamma\gamma)})_{\alpha\beta'} (T^{(\sigma)a})_{\beta'\beta}$

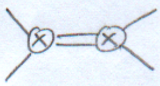
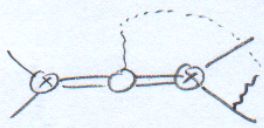
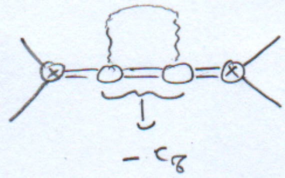
s'écrit:

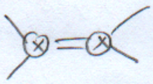
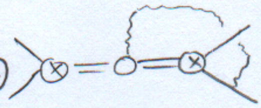


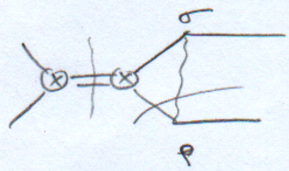
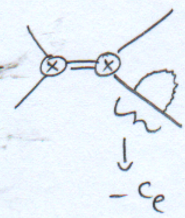
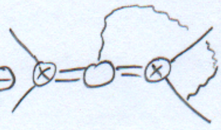
question 4

① $X_{\alpha\beta;\alpha'\beta'} = -$  $= -$ 

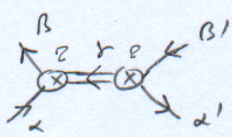
$= -$  $+$ 

$= + c_\sigma$  $+$  $+$ 

$= (c_\sigma - c_\gamma)$  ⊕ 

② $X_{\alpha\beta;\alpha'\beta'} = -$  $=$  ⊖ 

d'où, en combinant les deux écritures ① et ② :

$X_{\alpha\beta;\alpha'\beta'} = \frac{1}{2}(c_\sigma + c_\rho - c_\gamma)$ 

$= \frac{1}{2}(c_\sigma + c_\rho - c_\gamma)(\mathcal{M}^{(\gamma\gamma)})_{\alpha\beta}(\mathcal{M}^{(\gamma\gamma)})_{\alpha'\beta'}$