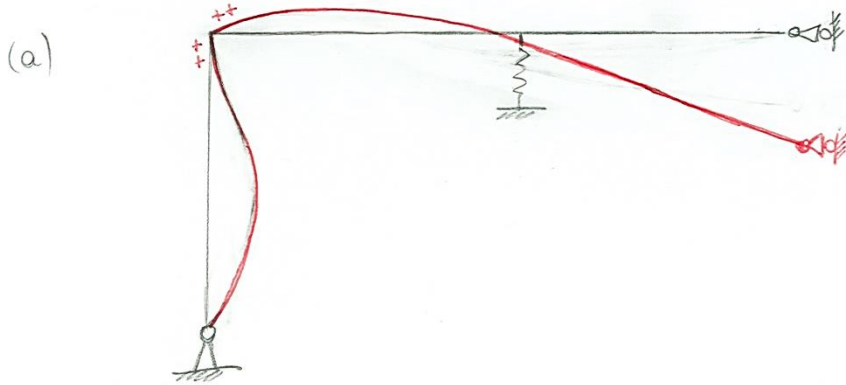
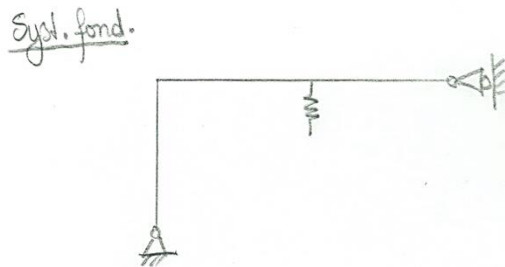


# Test Statique II - Corrigé

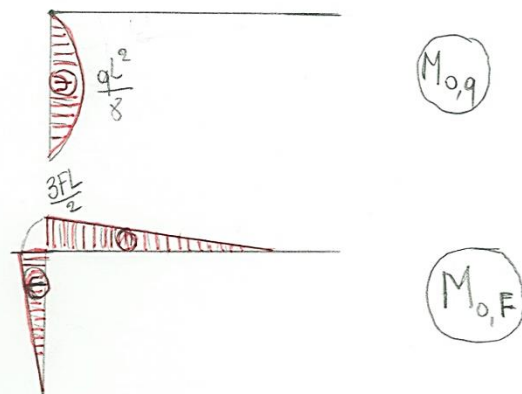
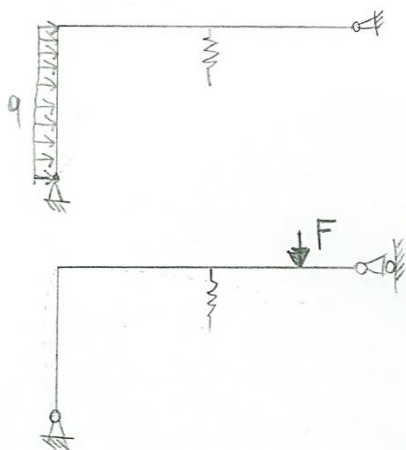
## Exercice 1

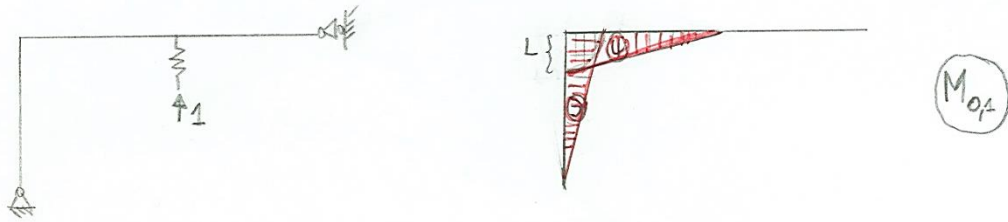


(b) La structure est 1 fois hyperstatique → METHODE DES FORCES



Calcul de  $\alpha_0$





$$\begin{aligned} \underline{w_{0,q}} &= \int \text{triangle} * 0 dx + \int_0^L \text{triangle} * \text{curved} dx \\ &= -\frac{1}{3} * L * \frac{qL^2}{8} * L \\ &= -\frac{qL^4}{24} \end{aligned}$$

$$\begin{aligned} w_{0,F} &= \int_0^L \text{triangle} * \text{triangle} dx + \int_0^L \text{triangle} * \text{triangle} dx \\ &= \frac{-1}{6} * L^2 * \left( \frac{1}{2} FL + 2 * \frac{3}{2} FL \right) + \frac{-1}{3} * L * \frac{3FL}{2} * L \\ &= \frac{-7}{12} FL^3 + \frac{-FL^3}{2} = -\frac{13FL^3}{12} \end{aligned}$$

→ donc par superposition on obtient  $w_0 = \underline{\underline{-\frac{13FL^3}{12} - \frac{qL^4}{24}}}$

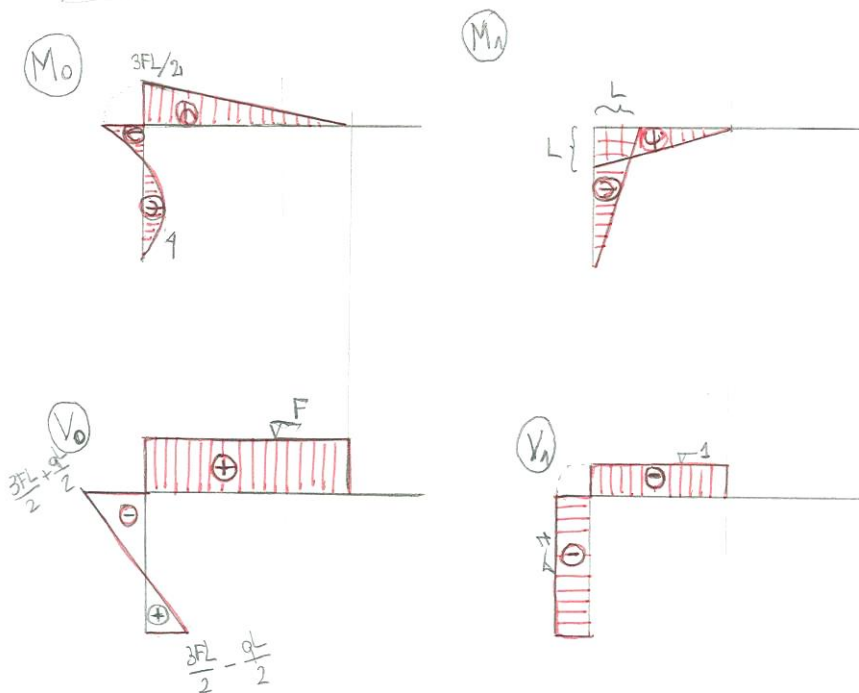
Calcul de  $w_1$ 

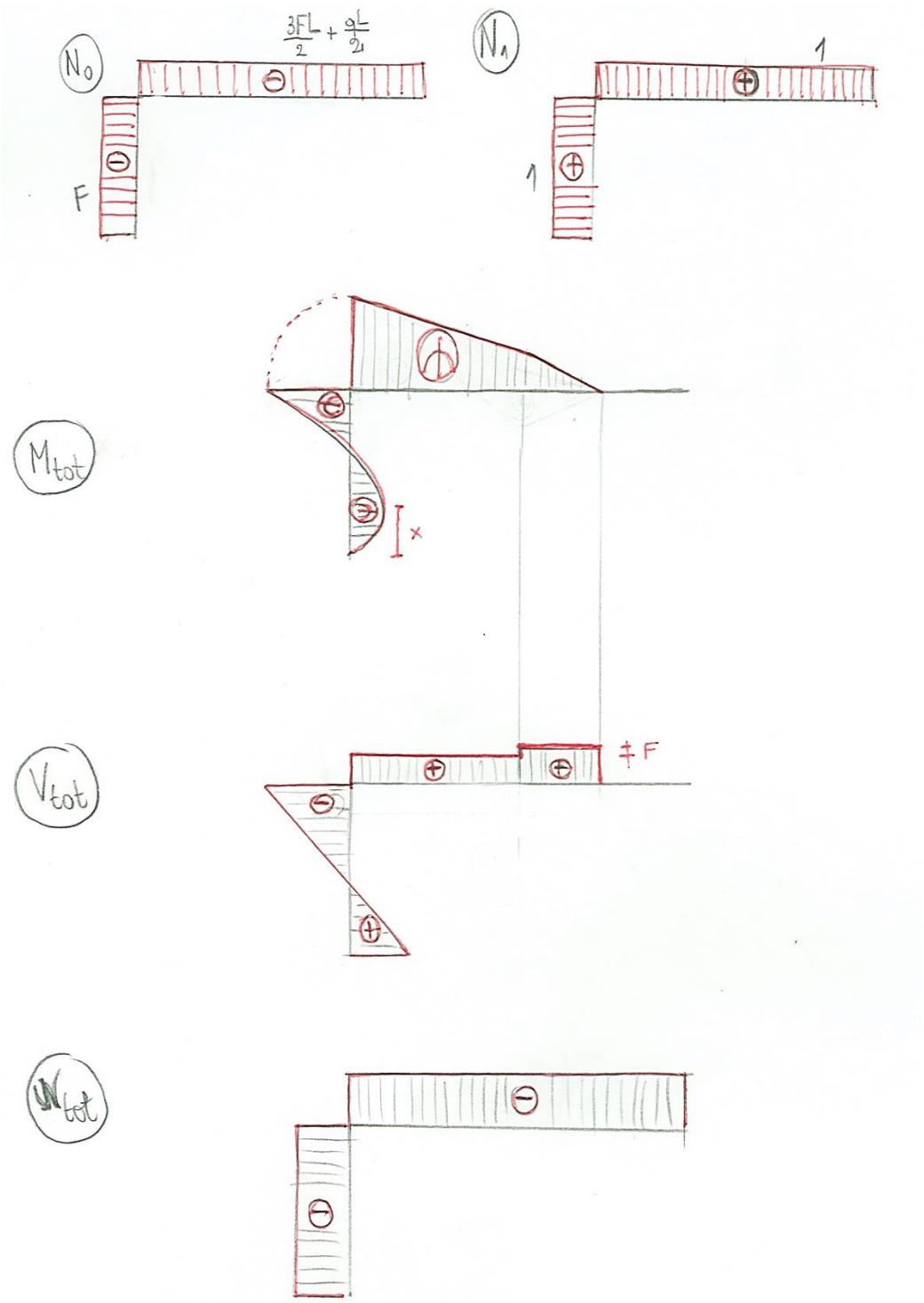
T -

On obtient  $w_1$  en multipliant  $M_{0,1}$  par soi-même :

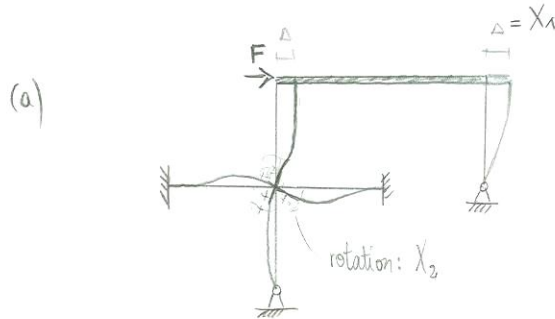
$$\begin{aligned}
 w_1 &= \int \text{triangle} * \text{triangle} dx + \int \text{triangle} * \text{triangle} dx + \frac{1 \cdot 1}{K} \\
 &= \frac{1}{3} L \cdot L \cdot L + \frac{1}{3} \cdot L \cdot L \cdot L + \frac{1}{K} \\
 &= \frac{2L^3}{3} + \frac{1}{K}
 \end{aligned}$$

$$\underline{X} = \frac{-w_0}{w_1} = - \frac{-26FL^3 - qL^4}{24 \cdot \left( \frac{2L^3}{3} + \frac{1}{K} \right)}$$





Exercice 2



(b) 2 inconnues en déplacement ; 7 x hyperstatique  
 ⇒ méthode des déplacements

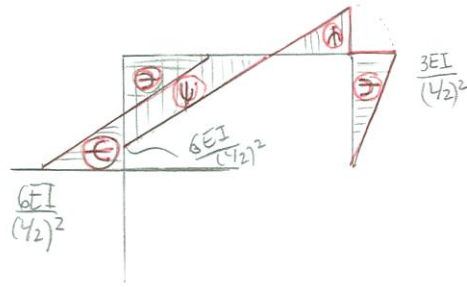
	 $X_1=1$	 $X_2=2$	FORCE EXTERNE
selon $X_1$	$= \frac{120EI}{L^3}$	$= \frac{24EI}{L^2}$	 $F$
selon $X_2$	$= \frac{-24EI}{L^2}$	$= \frac{30EI}{L}$	0

$$\frac{120EI}{L^3} X_1 - \frac{24EI}{L^2} X_2 - F = 0 \quad (1)$$

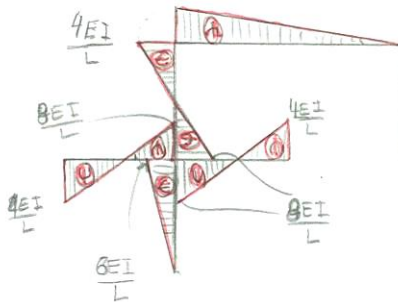
$$-\frac{24EI}{L^2} X_1 + \frac{30EI}{L} X_2 = 0 \quad (2)$$

(c)

$M_1$



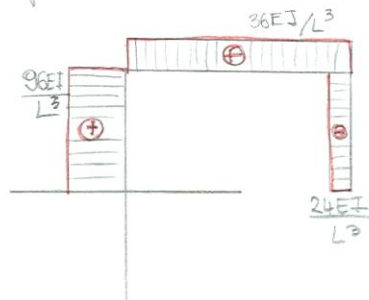
$M_2$



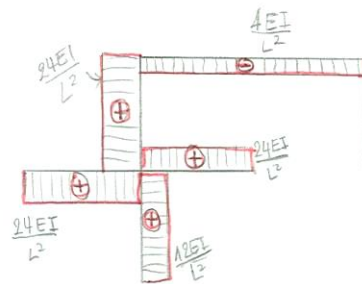
$M_0$

0 partout.

$V_1$

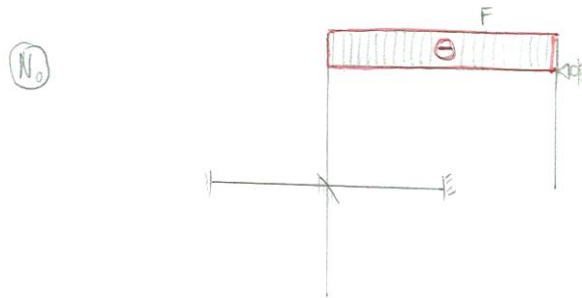
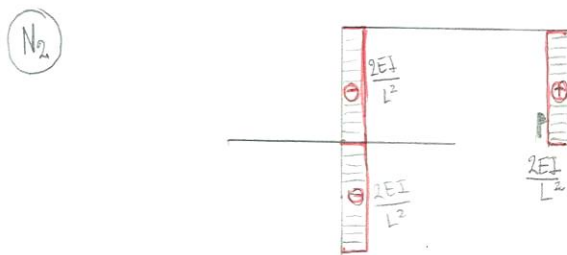
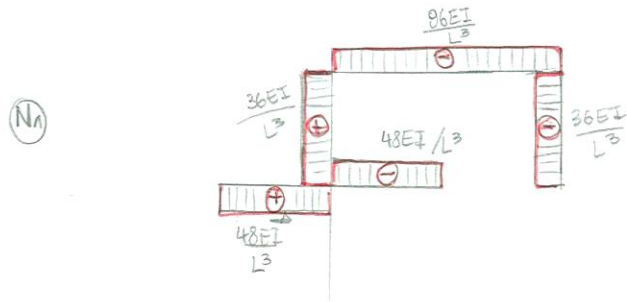


$V_2$

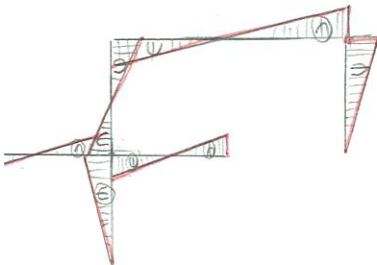


$V_0$

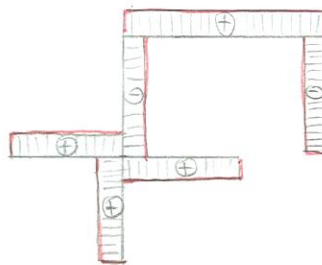
0 partout



$M_{tot}$



$V_{tot}$



$N_{tot}$

