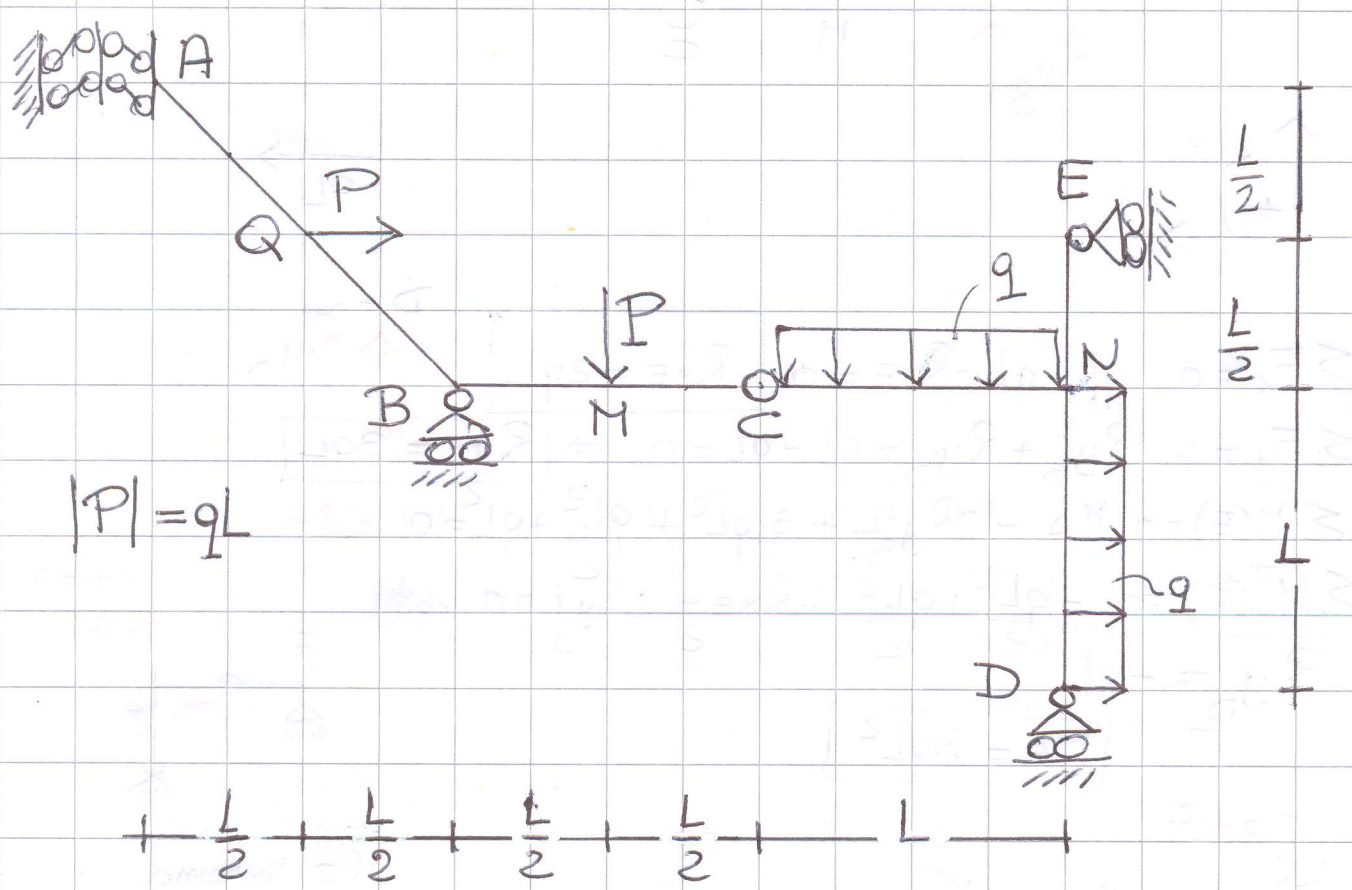
Test in itinere dell'8-5-2013

Corsi di Statica A-B; CdL Arch., PROF: AURORA PISANO

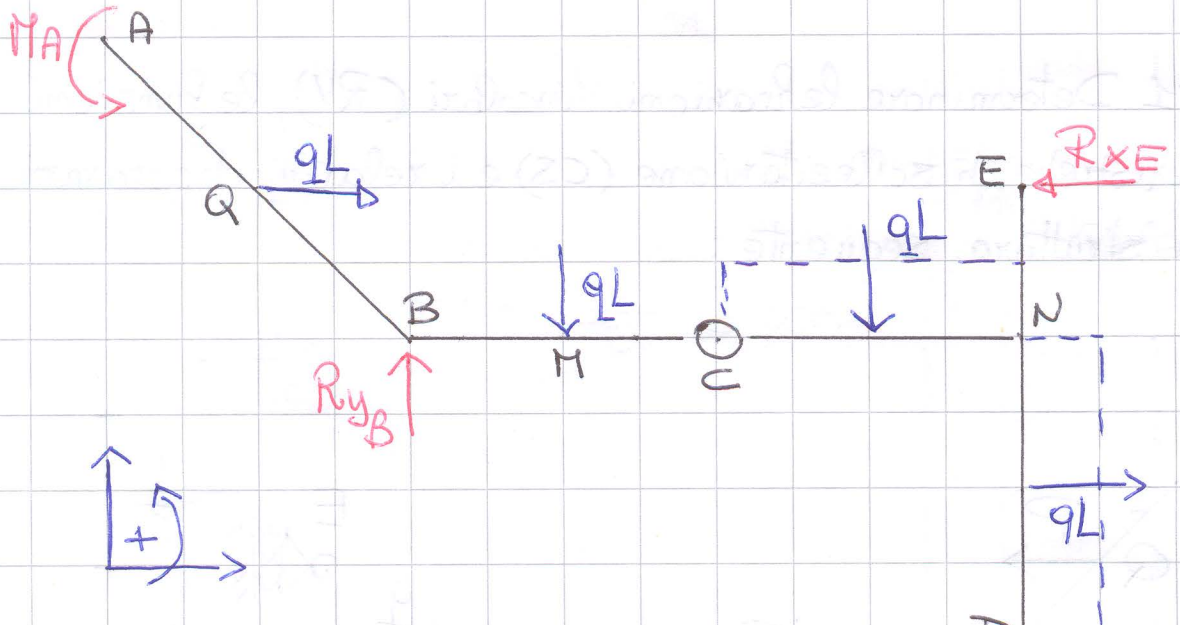
ES#1 Determinare le Reazioni Vincolari (RV), le funzioni caratteristiche di sollecitazione (CS) e i relativi diagrammi per la struttura seguente:



ES#2 Con riferimento alla struttura isostatica dell'ES#1 determinare le reazioni vincolari M_A ed R_{xc} tramite le condizioni di equilibrio dei cinematismi.

SOLUZIONE ES# 1

- Calcolo delle RV – metodo analitico



$\Sigma F_x = 0 \quad qL + qL - R_{xE} = 0 \quad \boxed{R_{xE} = 2qL}$

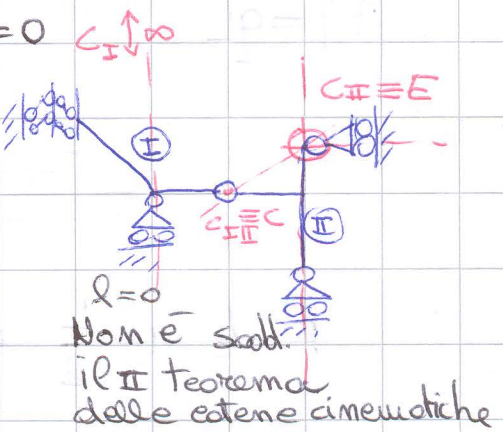
$\Sigma F_y = 0 \quad R_{y_B} + R_{y_D} - qL - qL = 0 \Rightarrow \boxed{R_{y_B} = 3qL}$

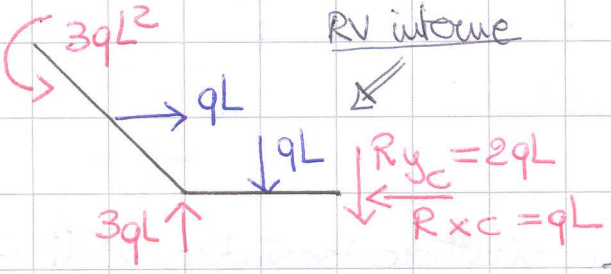
$\Sigma M(E) = 0 \quad M_A - 2R_{y_B}qL + \frac{3}{2}qL^2 + \frac{qL^2}{2} + qL^2 = 0$

$\Sigma M^{II}(C) = 0 \quad -\frac{qL^2}{2} + \frac{qL^2}{2} + R_{xE}\frac{L}{2} + R_{y_D}L = 0$

$\boxed{R_{y_D} = -qL}$

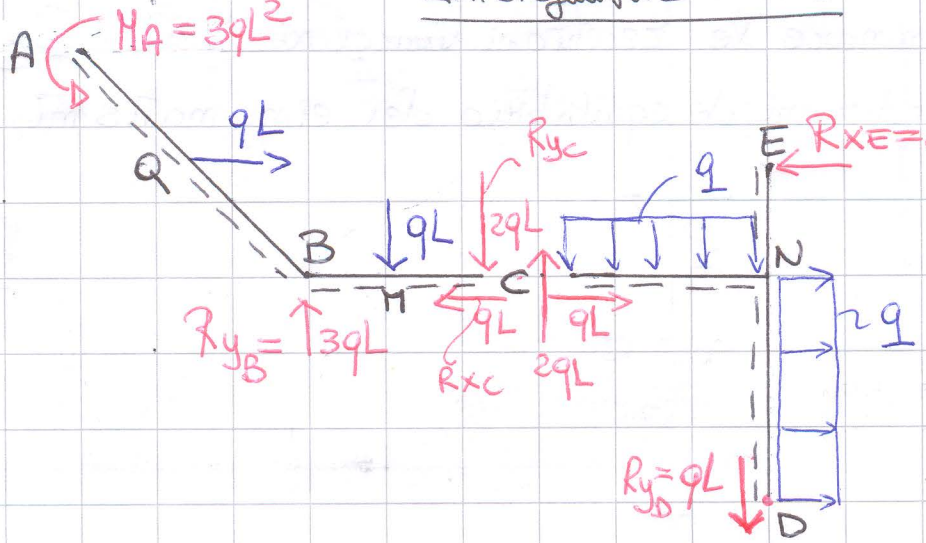
$\boxed{M_A = 3qL^2}$



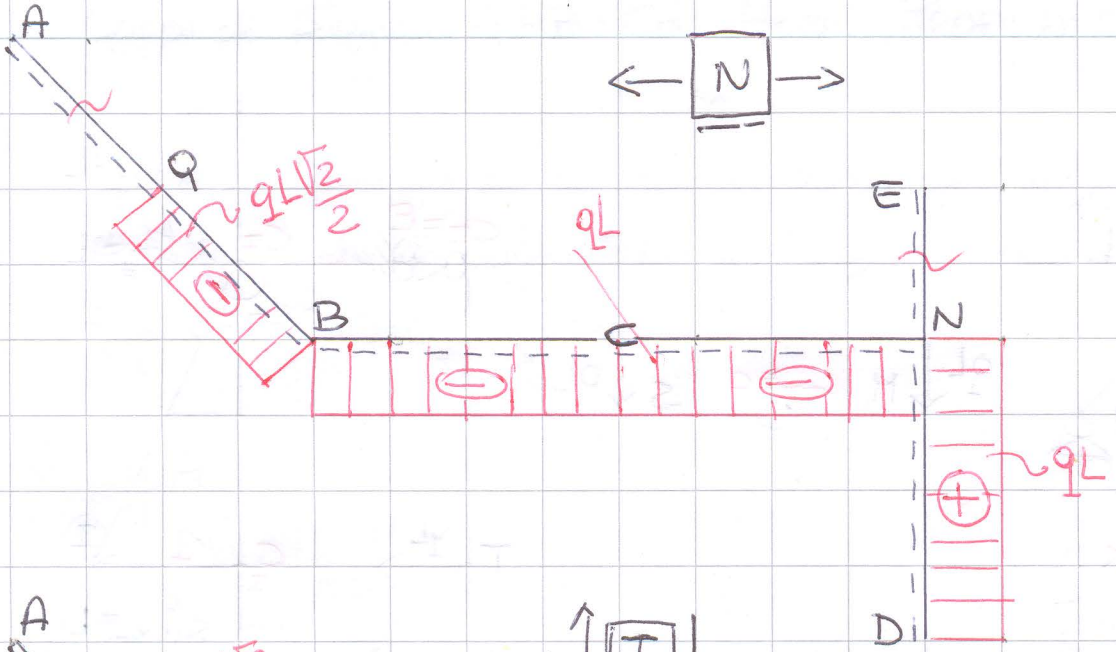


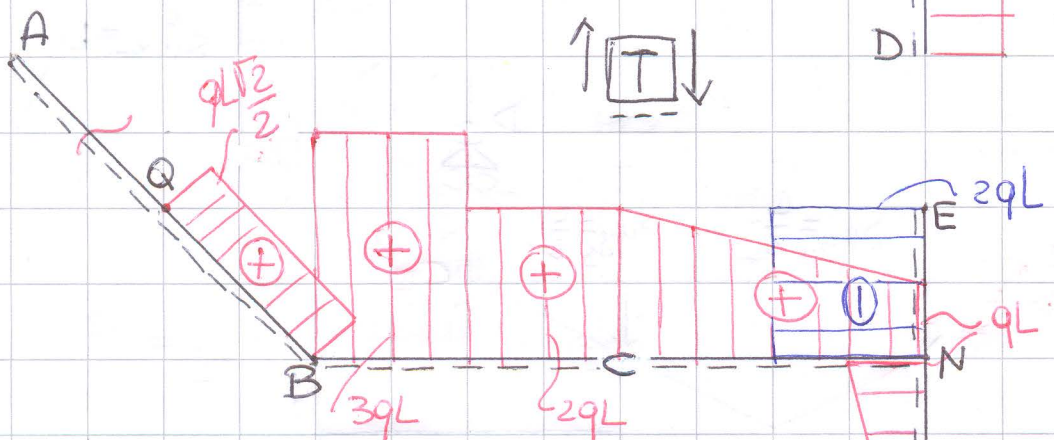
RV intorno

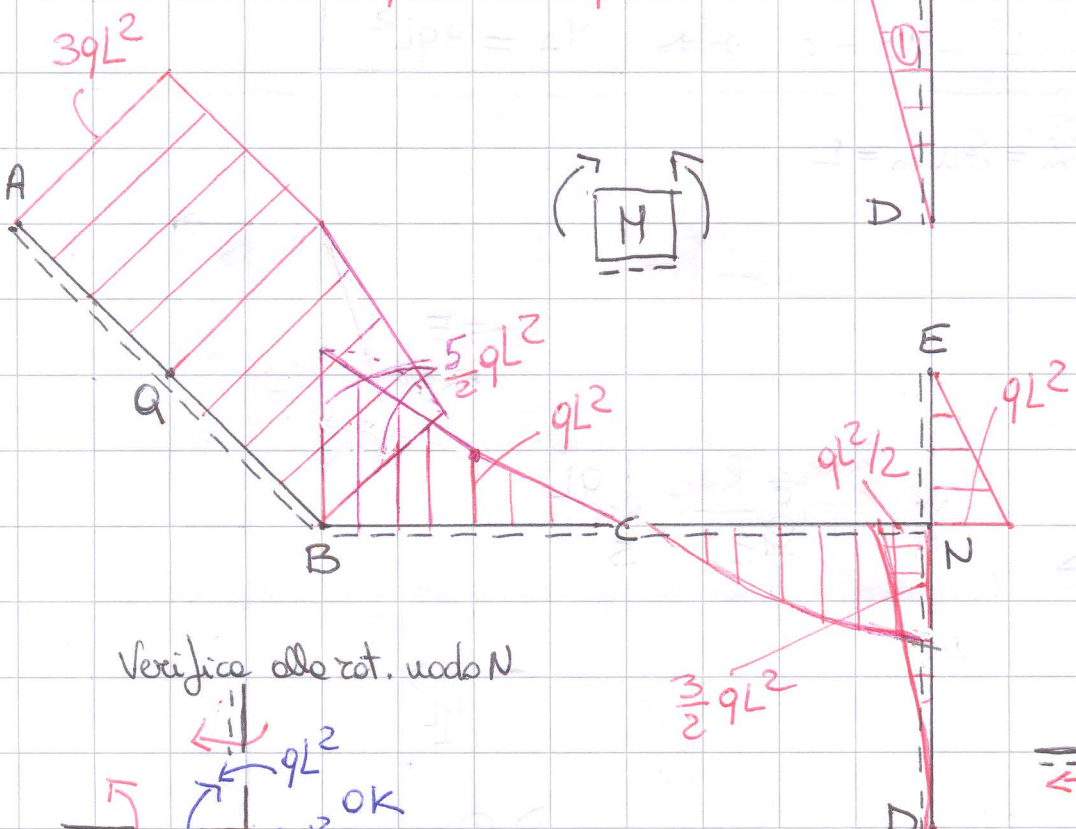
In definitiva si avrà



Diagrammi CS

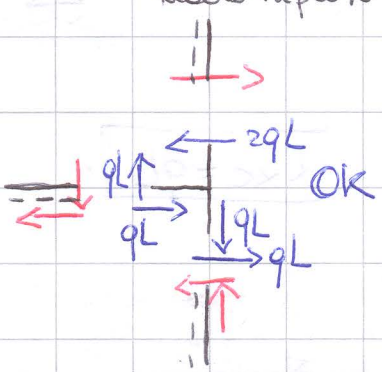






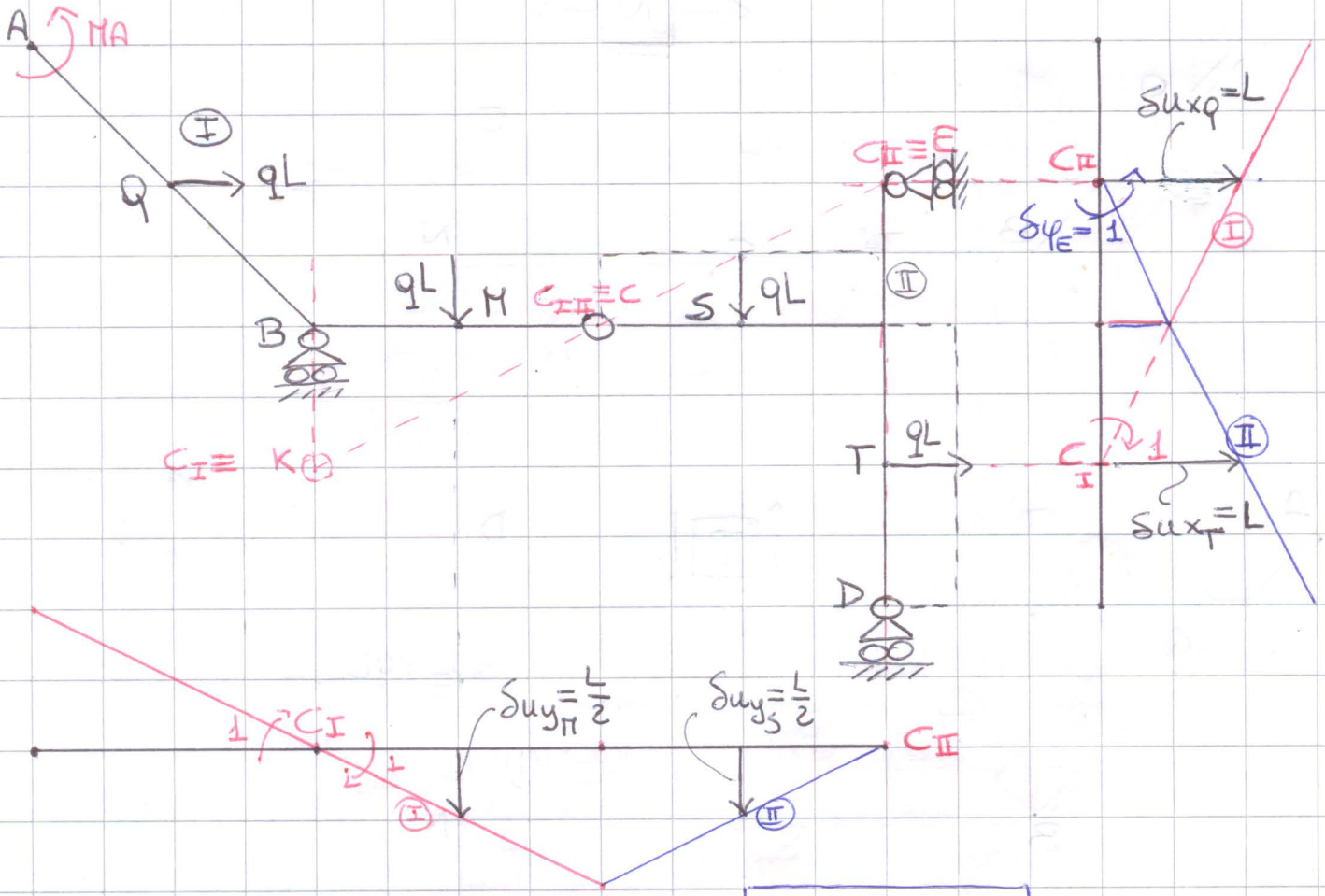
Verifica alla rot. nodo N

Verifica alla trasl. nodo triplo N



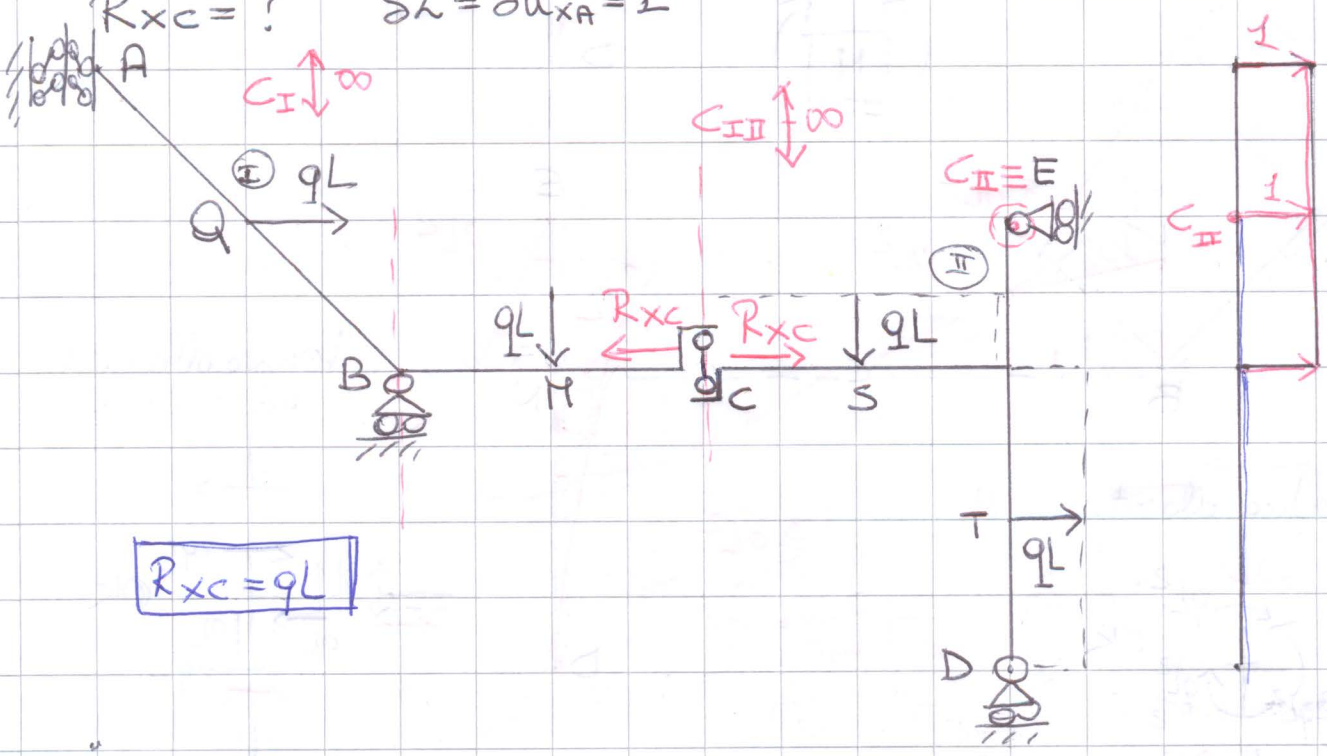
SOLUZIONE ES#2

$M_A = ?$ $\quad \delta\lambda = \delta\varphi_E = 1$

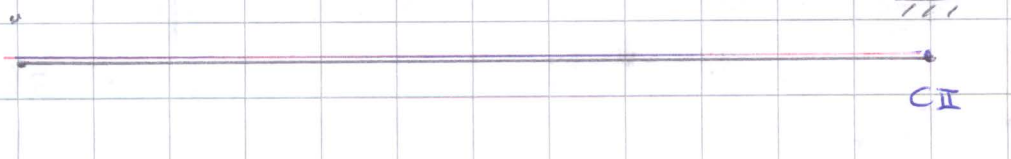


$$qL^2 + \frac{qL^2}{2} + \frac{qL^2}{2} + qL^2 - M_A = 0 \quad \Longrightarrow \quad \boxed{M_A = 3qL^2}$$

$R_{xC} = ?$ $\quad \delta\lambda = \delta u_{xA} = 1$



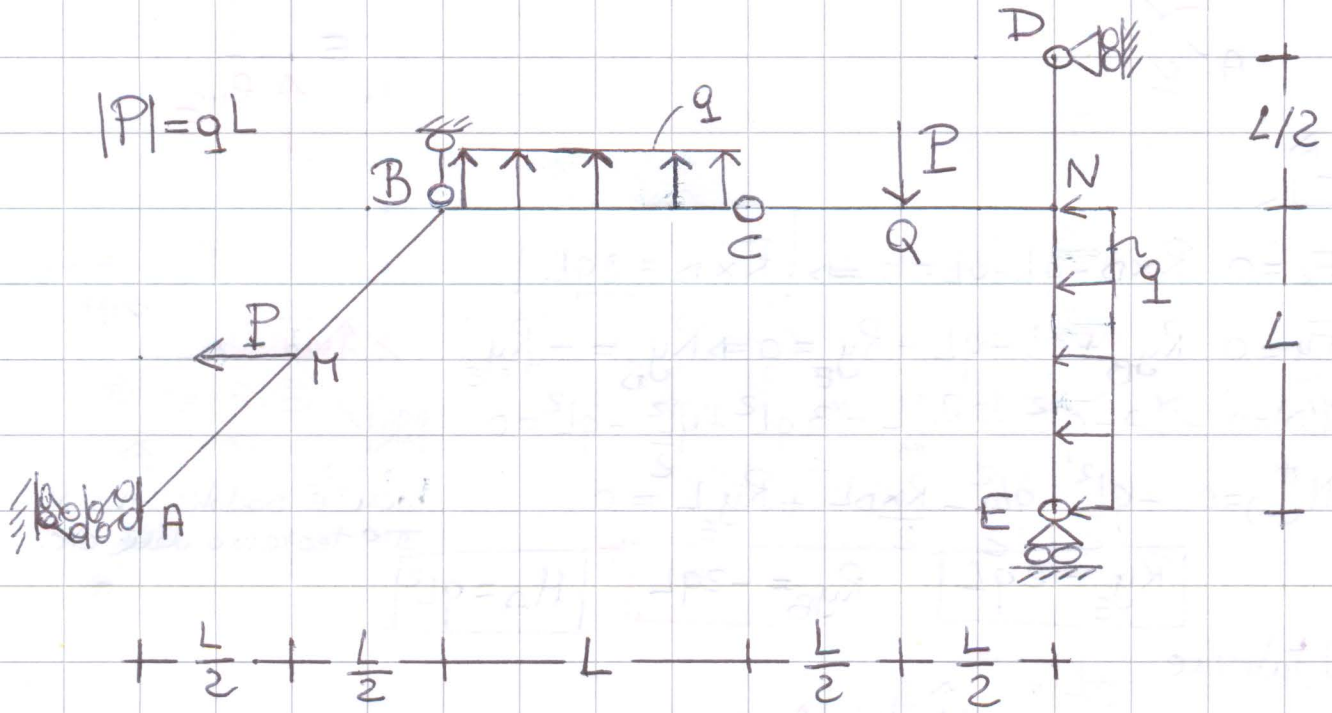
$$\boxed{R_{xC} = qL}$$



Test in itinere dell'8-5-2013

Corsi di Statica A-B; CdL Arch; PROF. AURORA PISANO

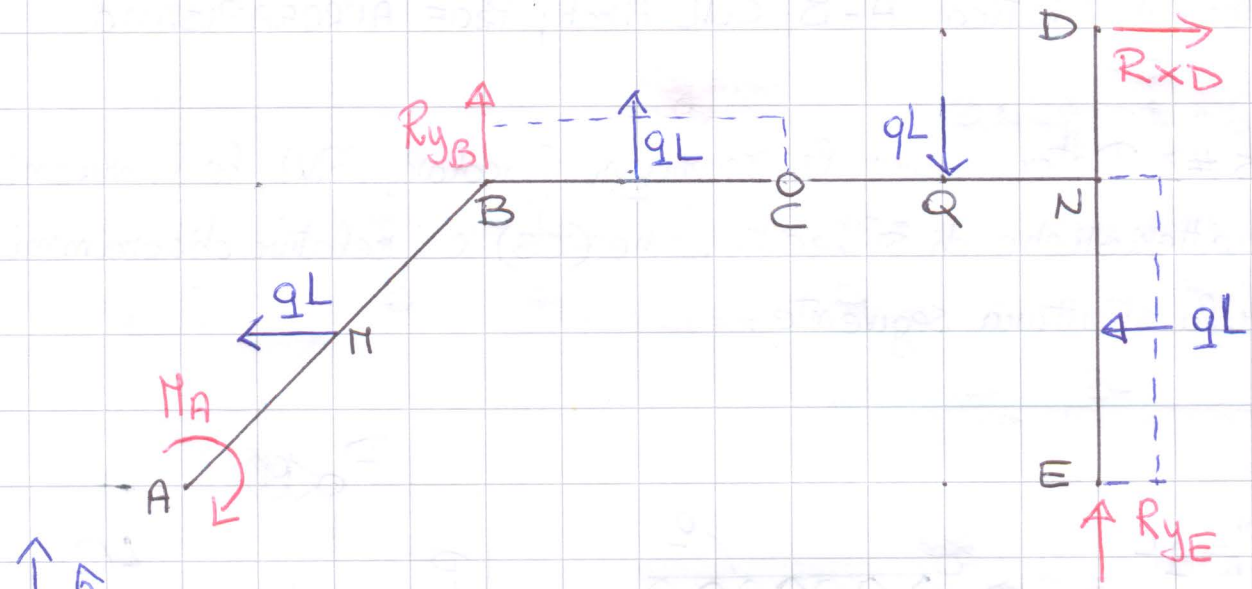
Es#1 Determinare le reazioni vincolari (RV), le funzioni caratteristiche di sollecitazione (CS) e i relativi diagrammi per la struttura seguente:



Es#2 Con riferimento alla struttura isostatica dell'Es#1 determinare le reazioni vincolari R_{y_E} ed R_{y_C} tramite le condizioni di equilibrio dei cinematismi.

SOLUZIONE ES#1

- Calcolo delle RV - metodo analitico



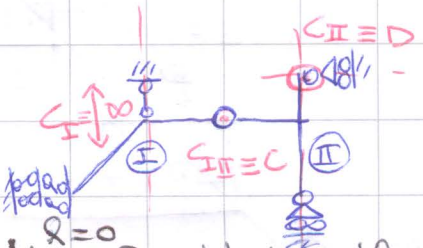
$\Sigma F_x = 0 \quad R_{xD} - qL - qL = 0 \Rightarrow \boxed{R_{xD} = 2qL}$

$\Sigma F_y = 0 \quad Ry_B + qL - qL + Ry_E = 0 \Rightarrow Ry_B = -Ry_E$

$\Sigma M(D) = 0 \quad -M_A - qL^2 - 2Ry_B L - \frac{3}{2}qL^2 + \frac{qL^2}{2} - qL^2 = 0$

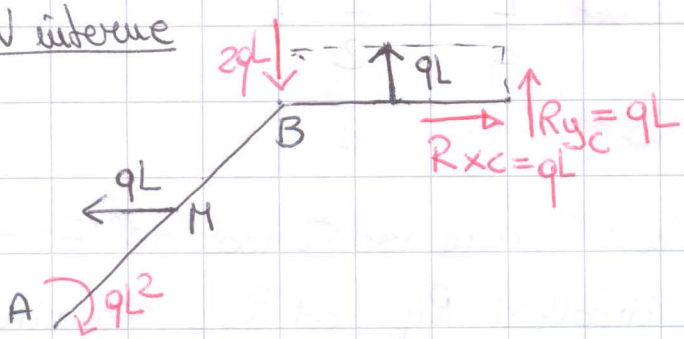
$\Sigma M^{II}_{(C)} = 0 \quad -\frac{qL^2}{2} - \frac{qL^2}{2} - \frac{R_{xD}L}{2} + Ry_E L = 0$

$\boxed{Ry_E = 2qL} \qquad \boxed{Ry_B = -2qL}^{*} \qquad \boxed{M_A = qL^2}$

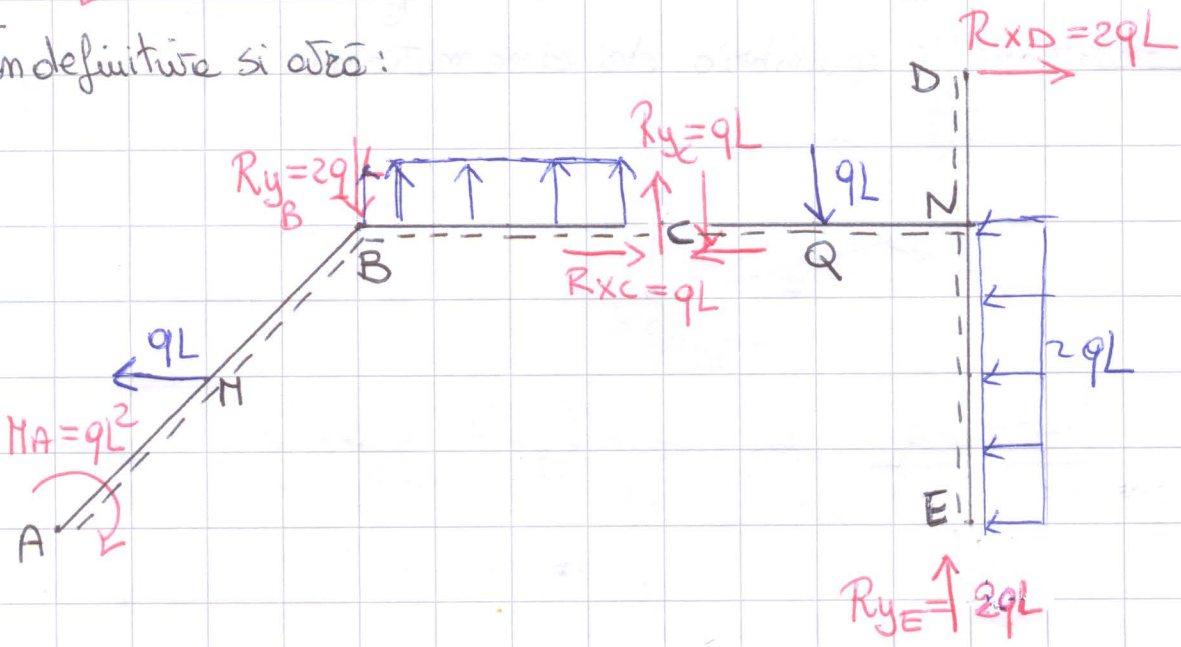


Non è soddisfatto il II° teorema delle C.C.

RV interne



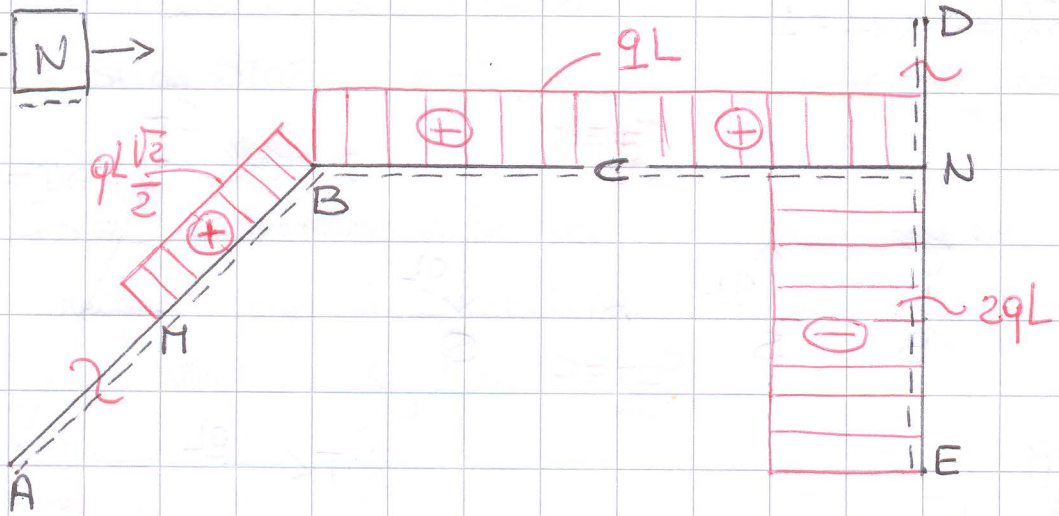
In definitiva si avrà:



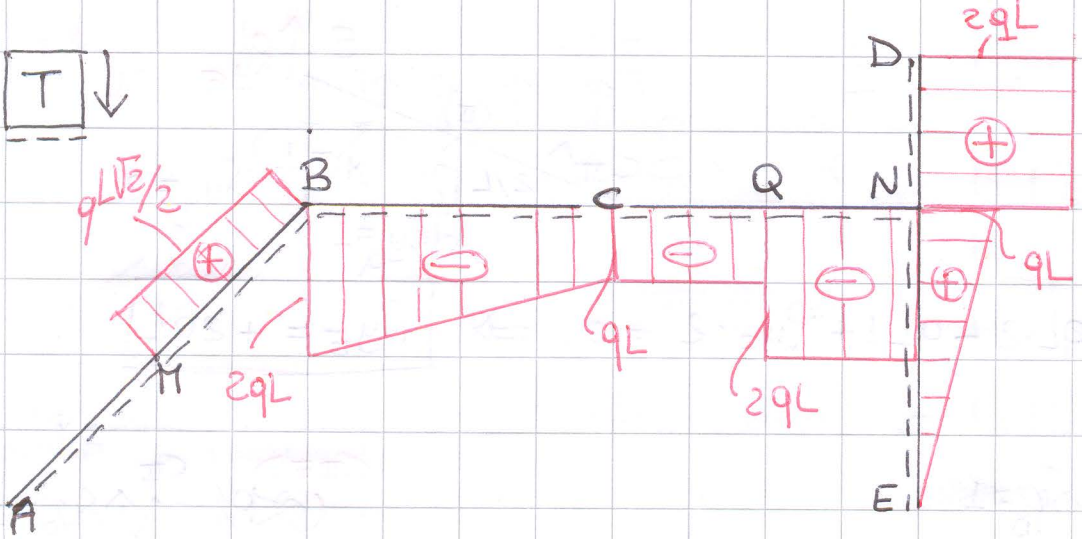
Diagrammi CS

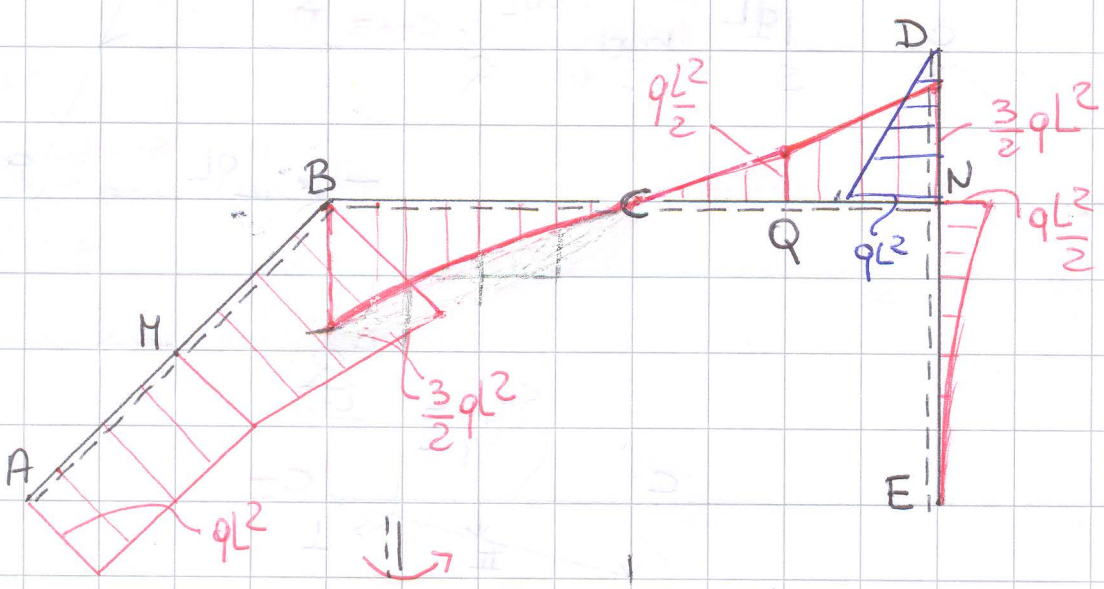
2

N

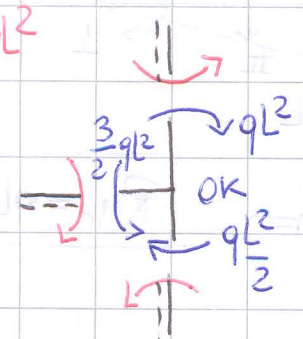


T

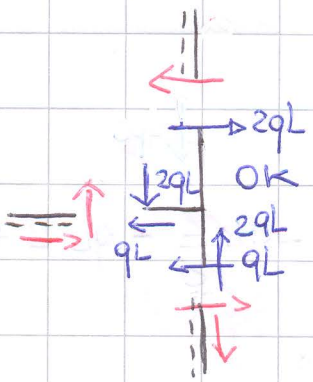




Equilibrio alla rotazione nodo N



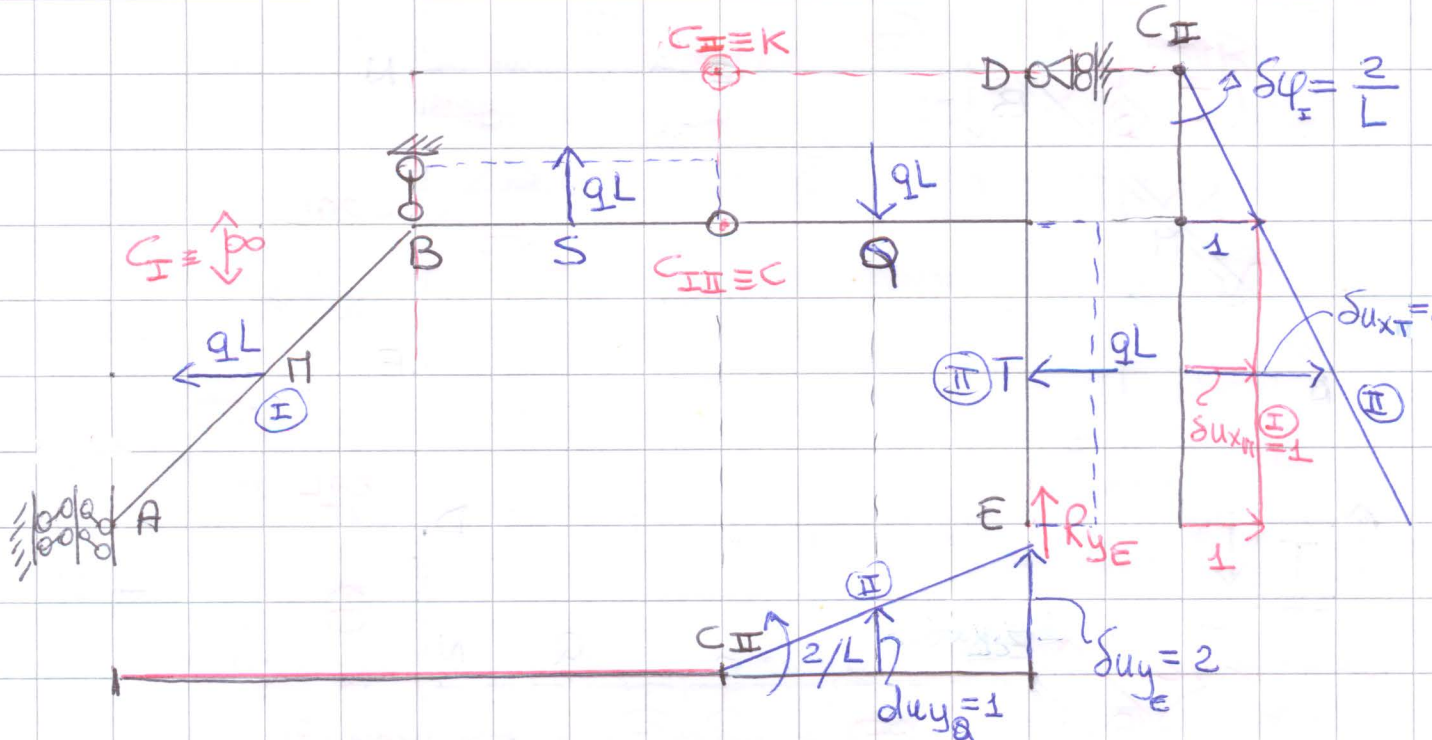
Equilibrio alla trasl. nodo N



SOLUZIONE ES#2

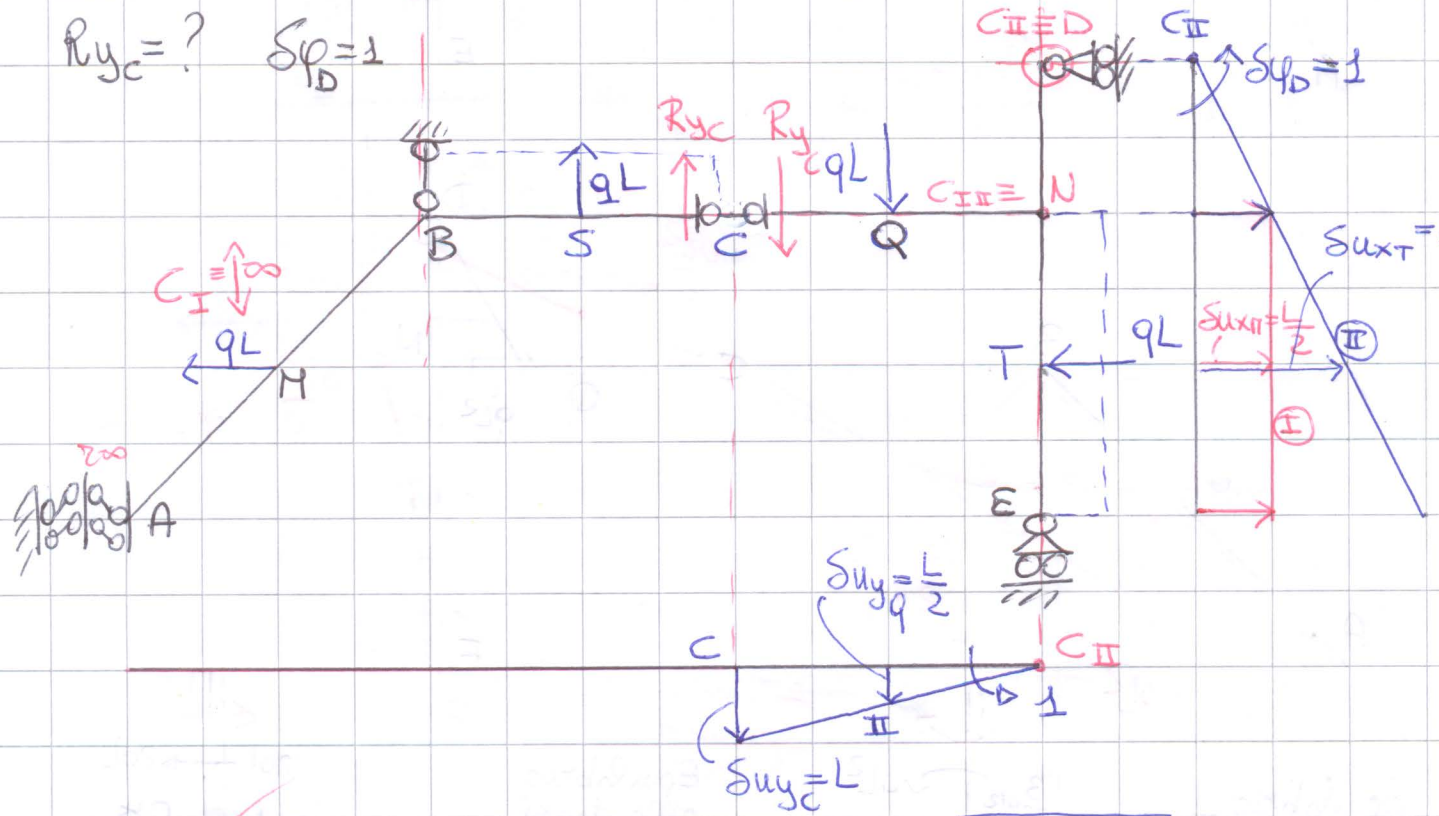
2

$Ry_E = ?$ $\delta h = \delta u_{xA} = 1$



$$-qL \cdot 1 - qL \cdot 2 - qL \cdot 1 + Ry_E \cdot 2 = 0 \Rightarrow \boxed{Ry_E = +2qL}$$

$Ry_C = ?$ $\delta\varphi_D = 1$



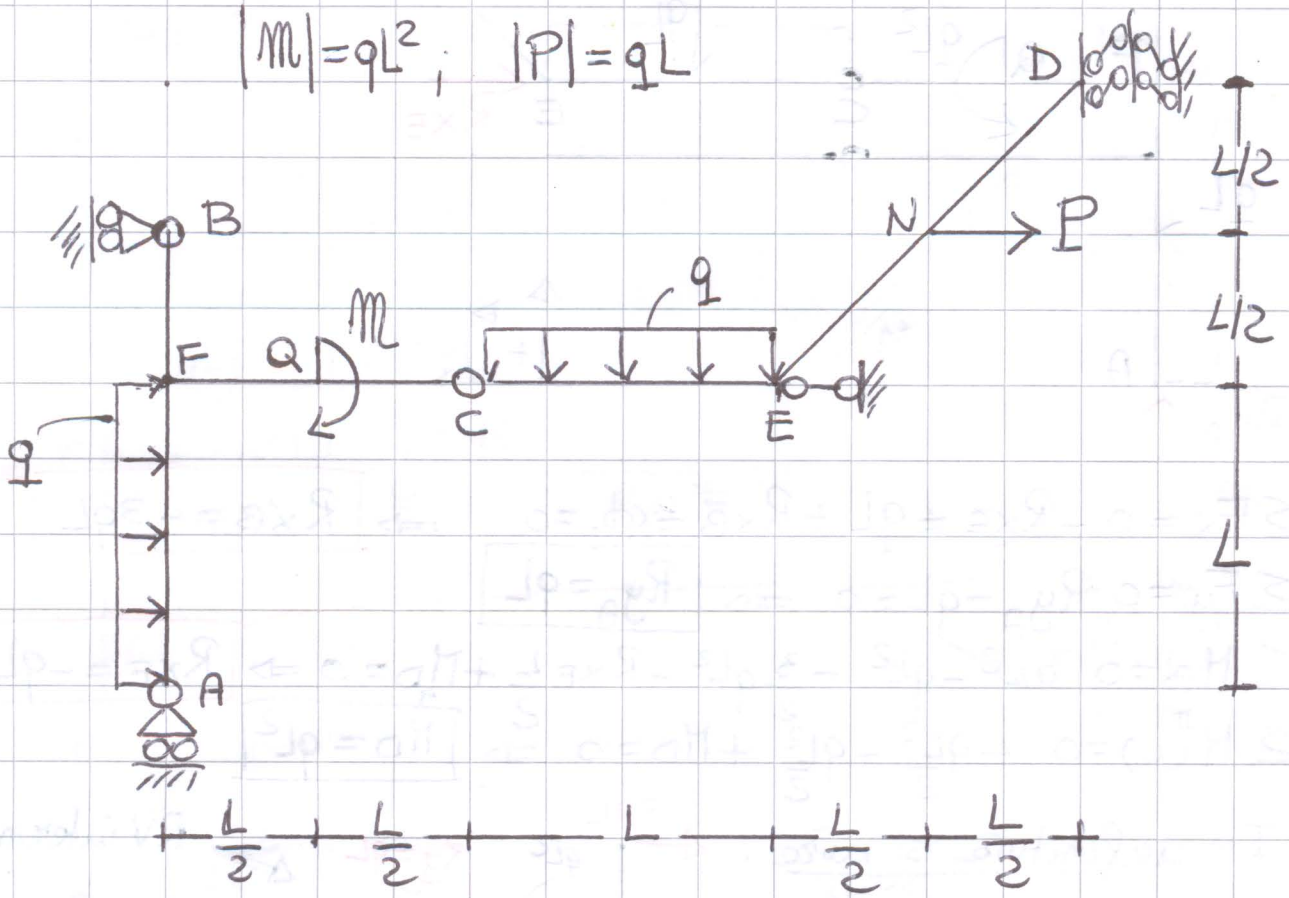
$$-qL \cdot \frac{L}{2} - qL \cdot L + qL \cdot \frac{L}{2} + Ry_C L = 0 \Rightarrow \boxed{Ry_C = qL}$$

Test in itinere dell' 8-5-2013

Corsi di Statica A-B; CdL Arch. PROF: AURORA PISANO

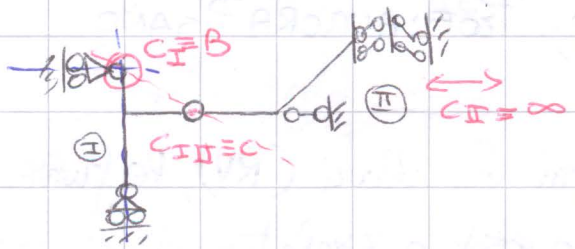
Es #1 Determinare le reazioni vincolari (RV), le funzioni caratteristiche di sollecitazione (CS) e i relativi diagrammi per la struttura seguente:

$|M| = qL^2$; $|P| = qL$



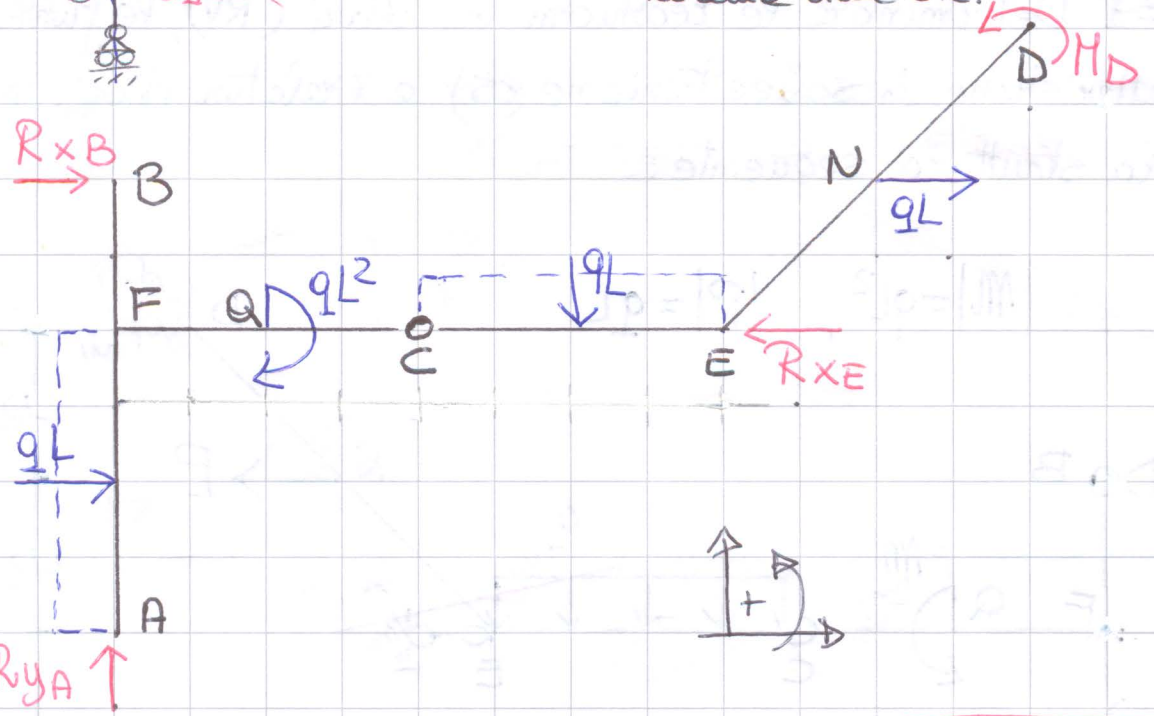
Es #2 Con riferimento alla struttura isostatica dell'ES #1 determinare le reazioni vincolari R_{xE} ed R_{xC} tramite le condizioni di equilibrio dei cinematismi.

SOLUZIONE ES #1
Calcolo delle RV - metodo analitico



$l = 0$

Non è soddisfatto il II° teorema delle c.c.



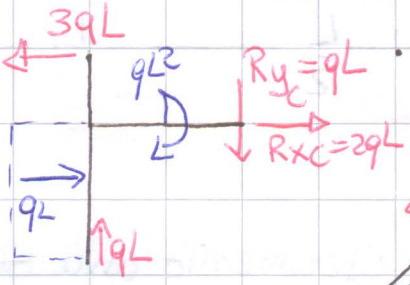
$\Sigma F_x = 0 \quad -R_{xE} + qL + R_{xB} + qL = 0 \Rightarrow \boxed{R_{xB} = -3qL}$ *

$\Sigma F_y = 0 \quad Ry_A - qL = 0 \Rightarrow \boxed{Ry_A = qL}$

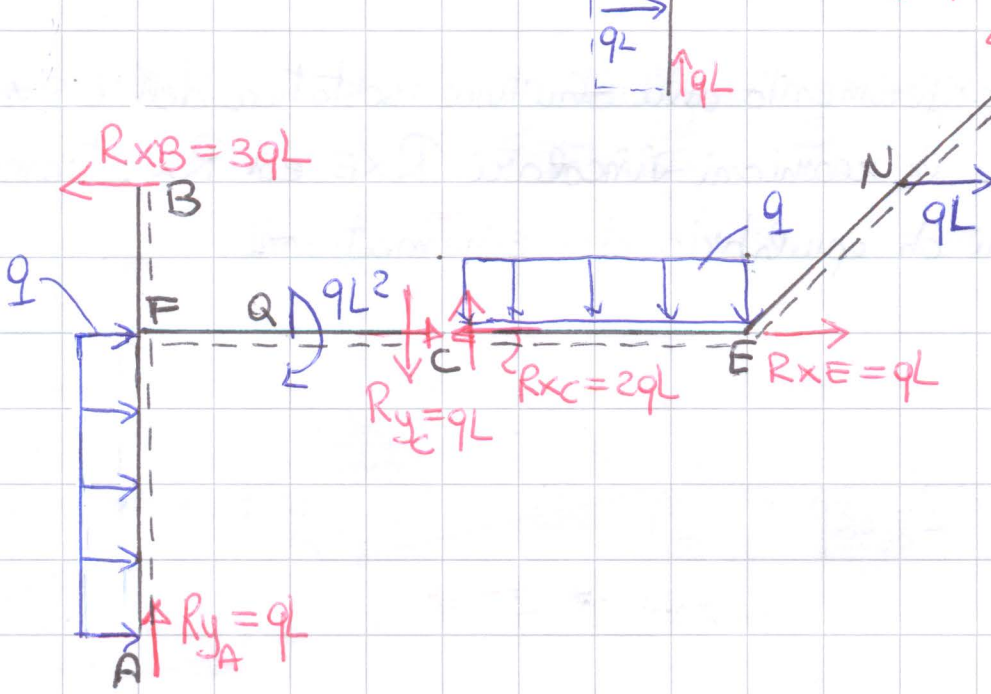
$\Sigma M_B = 0 \quad qL^2 - qL^2 - \frac{3}{2}qL^2 - R_{xE}\frac{L}{2} + M_D = 0 \Rightarrow \boxed{R_{xE} = -qL}$ *

$\Sigma M^{II}(C) = 0 \quad -\frac{qL^2}{2} - \frac{qL^2}{2} + M_D = 0 \Rightarrow \boxed{M_D = qL^2}$

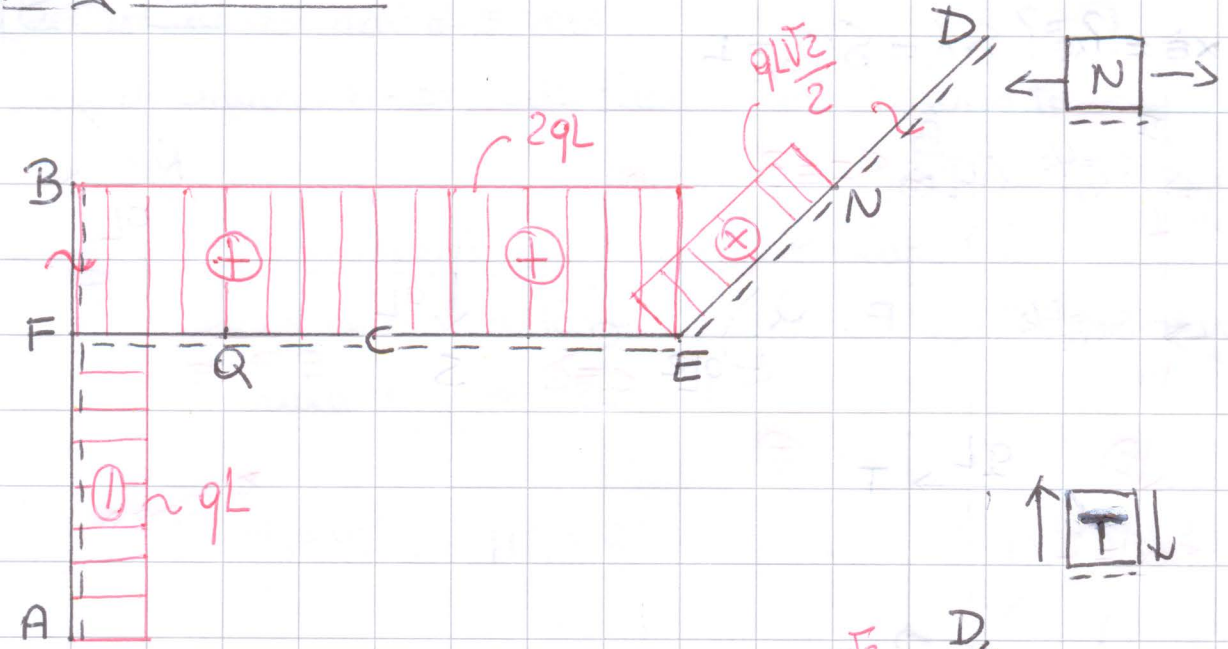
<u>In definitiva si avrà</u>:

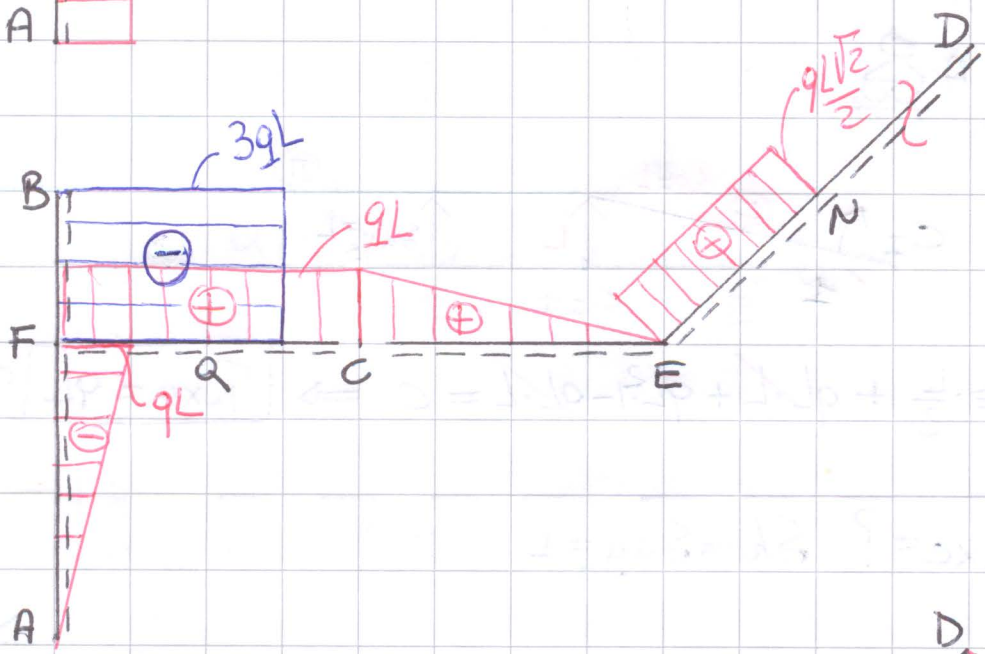


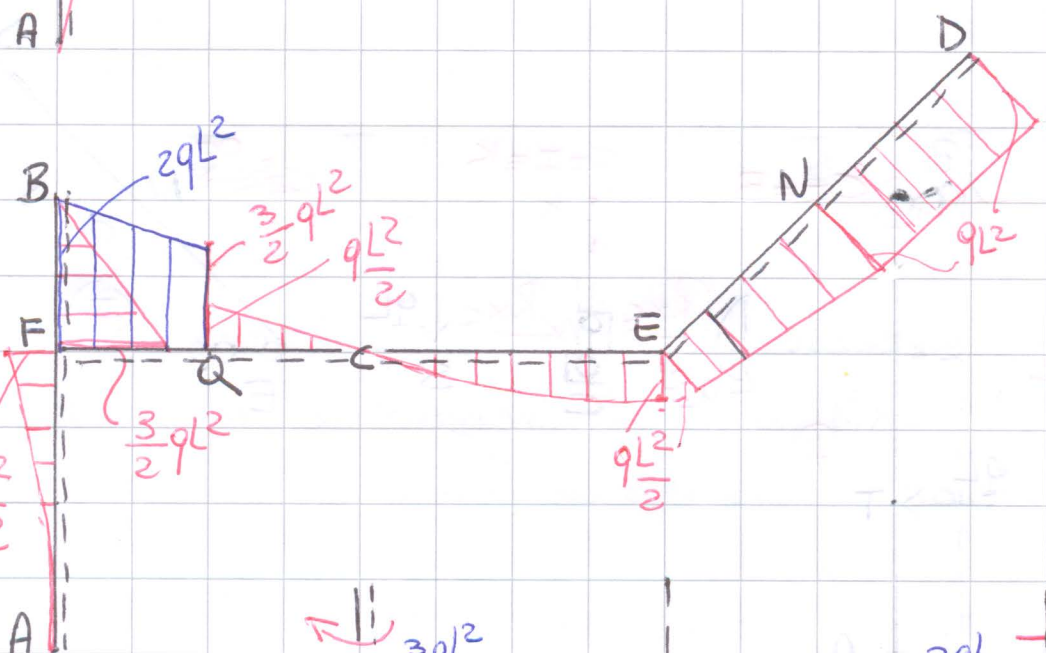
← RV interne

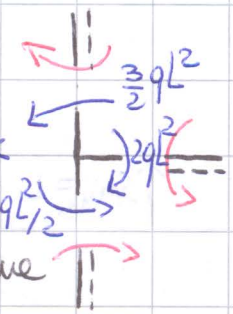


Diagrammi CS

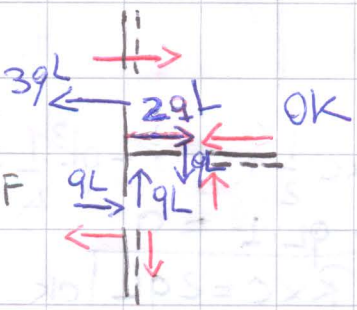








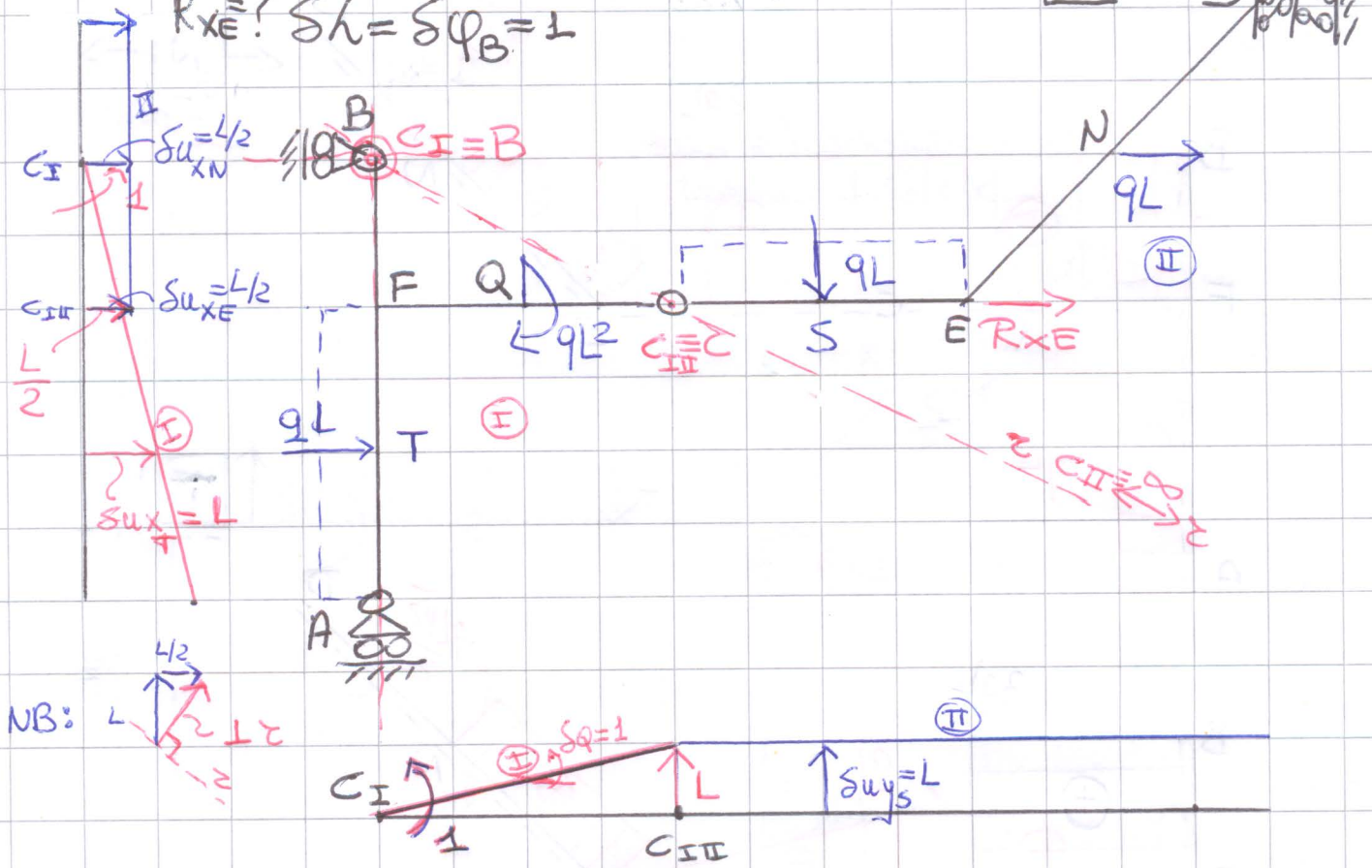
Verifica alle rotoriche nodo F



Verifica alle Trasf. nodo F

SOLUZIONE ES #2

$R_{xE}=?\quad \delta h=\delta\varphi_B=1$



$$qL\cdot\frac{L}{2}+R_{xE}\cdot\frac{L}{2}+qL\cdot L-qL^2\cdot 1-qL\cdot L=0 \Rightarrow \boxed{R_{xE}=qL}\ \text{ok}$$

$R_{xC}=?\quad \delta h=\delta u_{y_D}=1$