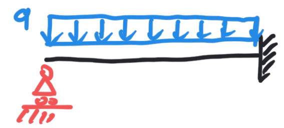
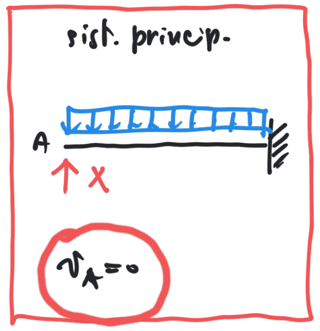
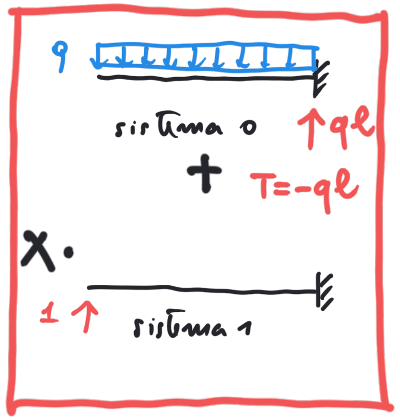
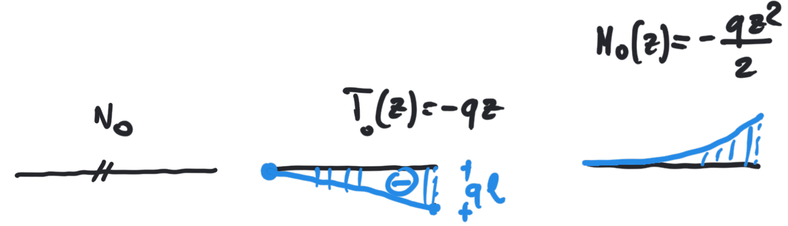
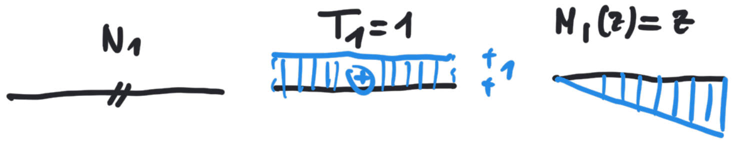
$\gamma = 0$











$M = M_0 + X M_1$

$\chi = \chi_0 + X \chi_1$

$v = v_0 + X v_1$

$\vdots$

PLV sistema 1 come sist. virt.

$$\mathcal{L}_{ve} = -1 \cdot v_A = 0$$

$$\parallel$$

$$\mathcal{L}_{vi} = \int_0^\ell \cancel{N_1 \underset{0}{\varepsilon}} + \cancel{T_1 \underset{0}{\gamma}} + M_1 \chi = \boxed{\frac{1}{EI}\int_0^\ell M_0 M_1 + \frac{X}{EI}\int_0^\ell M_1^2}$$

NB: $\varepsilon = \frac{N}{EA} + \underset{0}{\alpha \Delta T_m}$

$N = \underset{0}{N_0} + X \underset{0}{N_1} = 0$

$$\chi = \frac{M}{EI} = \frac{M_0}{EI} + X\frac{M_1}{EI}$$

$$\cancel{\frac{1}{EI}}\int_0^\ell M_0 M_1 + \frac{X}{\cancel{EI}}\int_0^\ell M_1^2 = 0 \Rightarrow X = -\frac{\int_0^\ell M_0 M_1}{\int_0^\ell M_1^2} = \frac{\frac{q\ell^4}{8}}{\frac{\ell^3}{3}}$$

$$\int_0^\ell M_1^2 = \int_0^\ell z^2 dz = \frac{\ell^3}{3}$$

$$\int_0^\ell M_0 M_1 = \int_0^\ell -\frac{qz^2}{2} z \, dz = -\frac{q}{8}\ell^4.$$