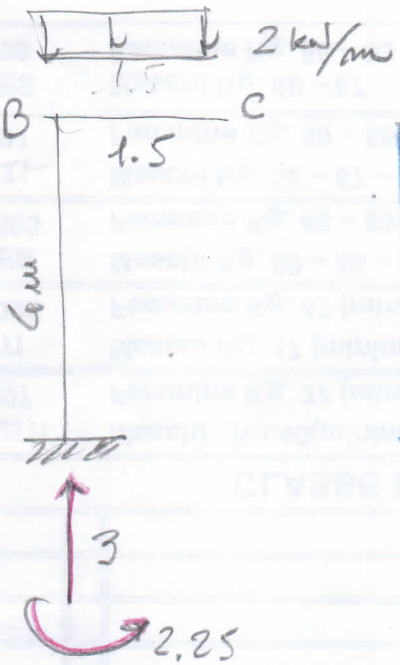
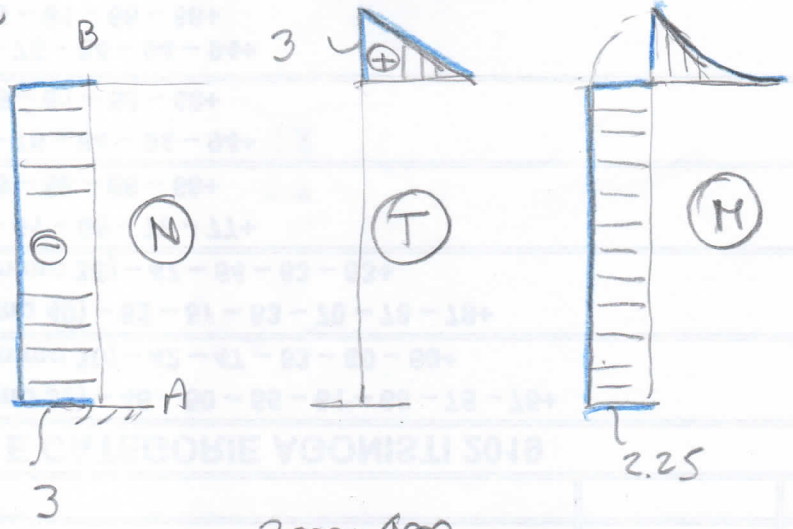
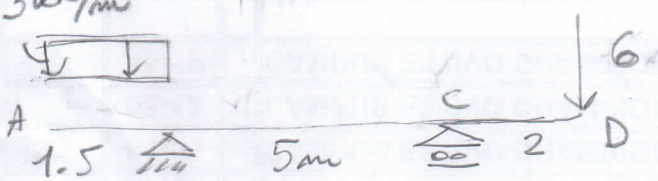




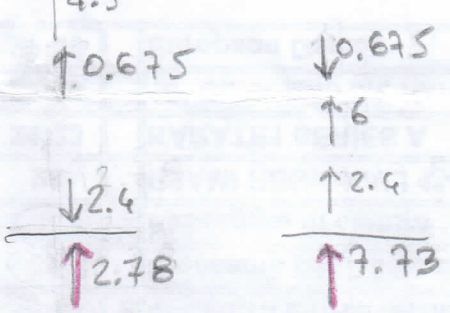
$$\int_B = \frac{3000 \times 4000}{20000 \times 100} = 6\ \text{mm}$$

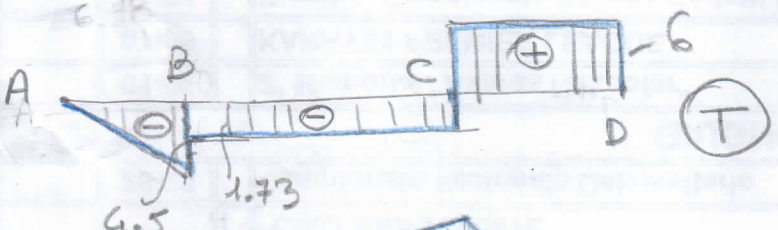
L_E L_A

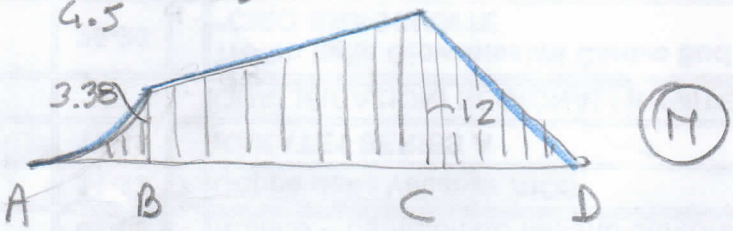
3 kN/m



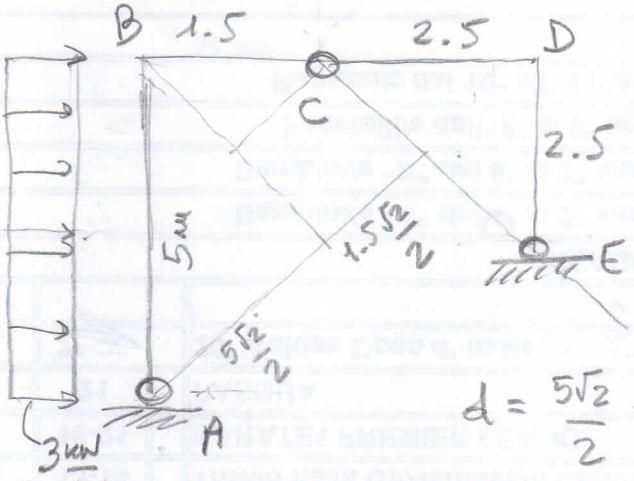
ES. 1



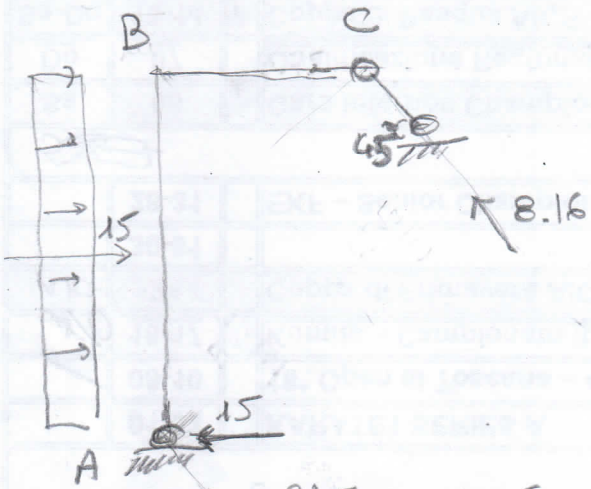




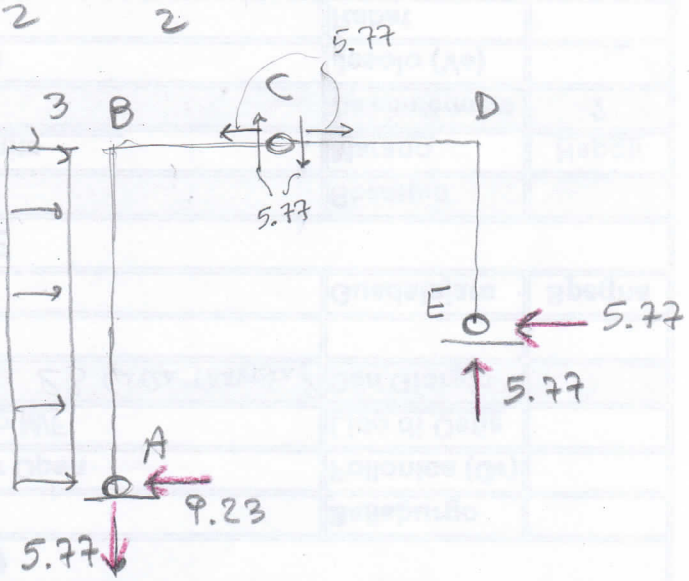
ES.2



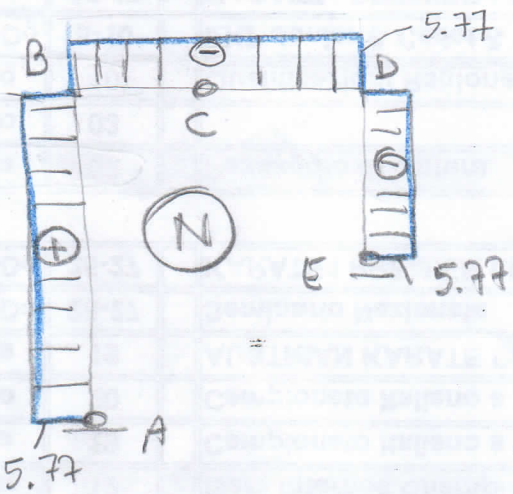
$$d = \frac{5\sqrt{2}}{2} + \frac{1.5\sqrt{2}}{2} = 6.5\frac{\sqrt{2}}{2} = 3.25\sqrt{2} = 4.60$$

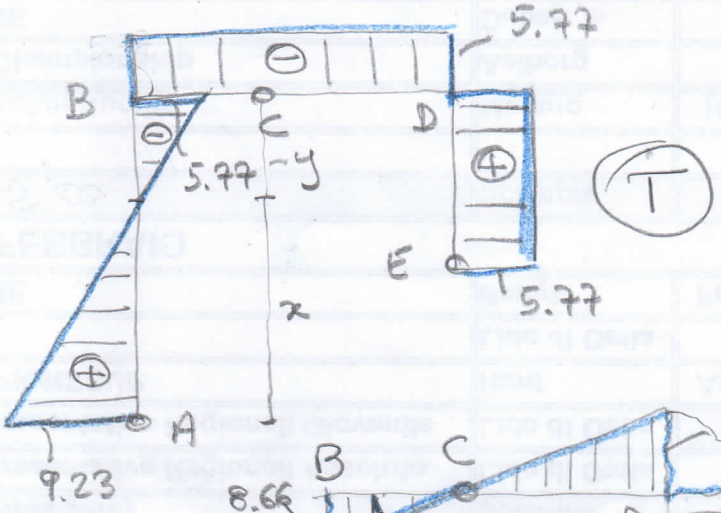


$$\frac{37.5}{3.25\sqrt{2}} = 5.77\sqrt{2} = 8.16$$

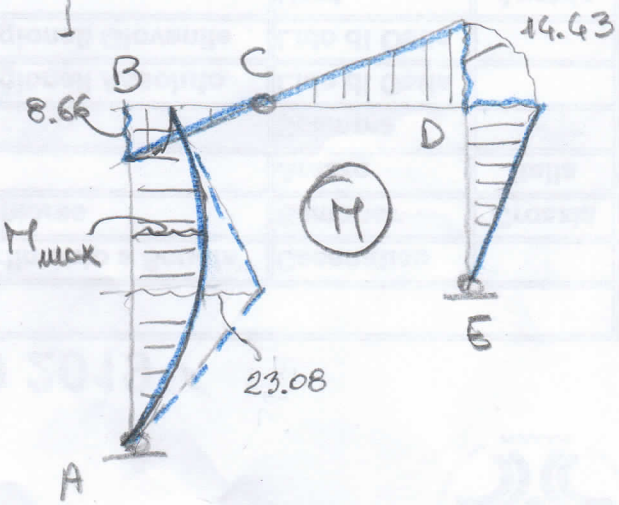


$$\leftarrow 15 + \underset{5.77}{\rightarrow} + \downarrow 5.77 = \leftarrow \overset{9.23}{} + \downarrow 5.77$$



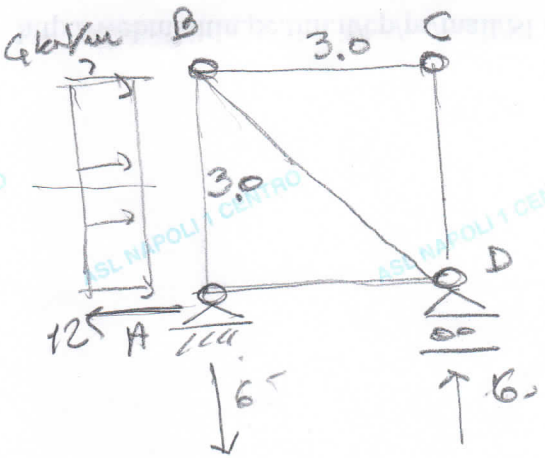


$$9.23 = 3x \Rightarrow x = 3.08 \quad y = 1.92$$

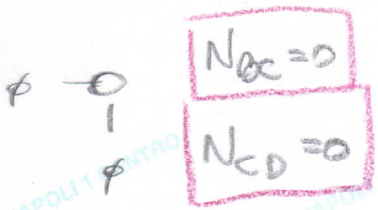


$$M_{max} = 9.23 \times \frac{3.08}{2} = 14.21 \text{ kNm}$$

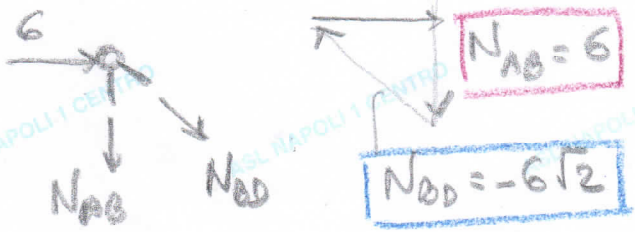
ES.3



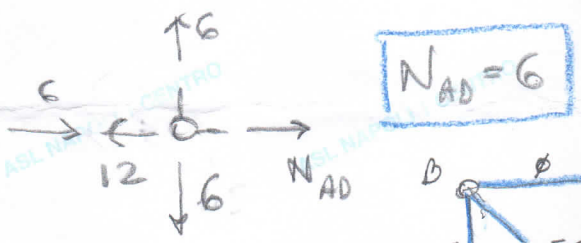
nodo C

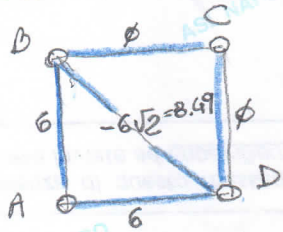


nodo B

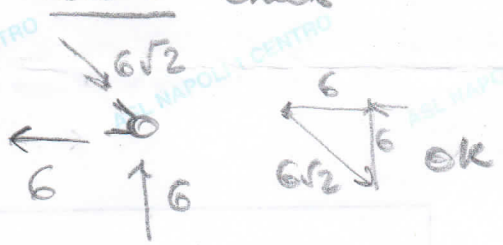


nodo A

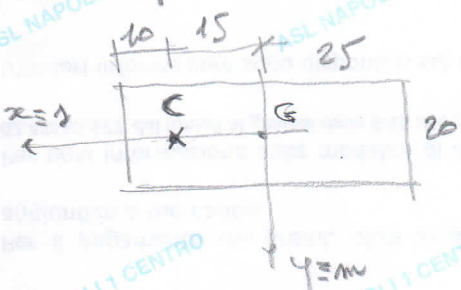




nodo D check



ES.4



$N_G = -40\ kN$

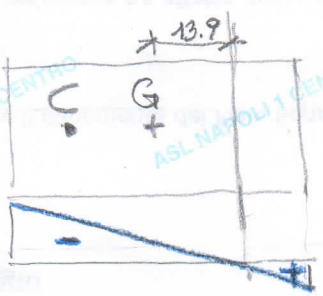
$A = 20 \times 50 = 1000\ cm^2$

$I_x = 50 \times \frac{20^3}{12} = 33333\ cm^4$

$I_y = 20 \cdot \frac{50^3}{12} = 208333$

$d_{G-M} = \frac{\rho_y^2}{CG} = \frac{208333}{1000 \times 15} = 13.9\ cm$

$M_y = 40 \times 0.15 = 6\ kNm$



$\sigma_z^{max} = -\underbrace{\frac{40000}{1000 \times 10^2}}_{0.4} - \underbrace{\frac{6 \times 10^6}{208333 \cdot 10^4}}_{0.00288} \cdot 250 = -1.12$

$\sigma_z^{min} = u - u\ (-250) = 0.32$