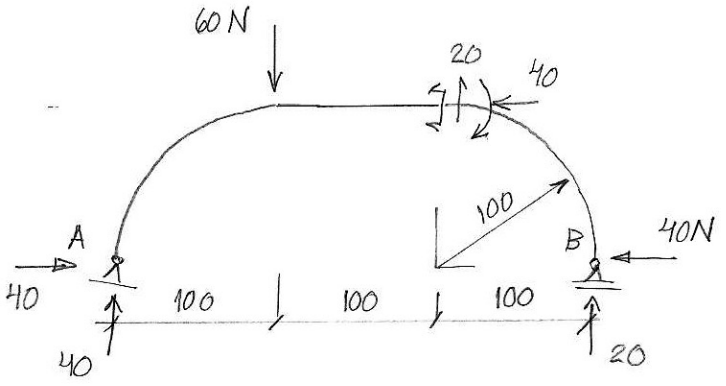
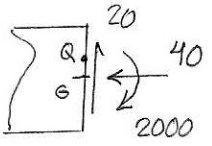


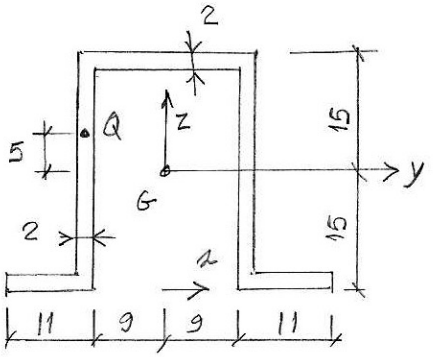
$\uparrow \quad R_A + R_B = 60$

$\circlearrowleft_B \quad R_A \times 300 - 60 \times 200 = 0 \qquad R_A = 40N$

$R_B = 20N$

$M_c = 20 \times 100 - 40 \times 100 = 2000 \text{ Nmm}$





$A = 4(9 \times 2) + 2(30 \times 2) = 192 \text{ mm}^2$

$I_y = 4\left(\frac{9 \times 2^3}{12} + 18 \times 14^2\right) + 2\left(\frac{2 \times 30^3}{12}\right) = 23136 \text{ mm}^4$

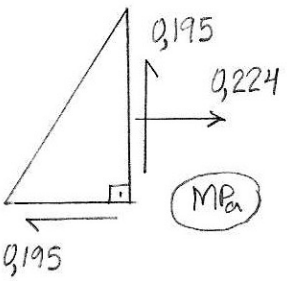
(verif. $I_y = \frac{22 \times 30^3}{12} - \frac{18 \times 26^3}{12} = 23136 \text{ mm}^4$)

$I_z = \frac{2 \times 40^3}{12} + 2\left(\frac{28 \times 2^3}{12} + 56 \times 10^2\right) = 21904 \text{ mm}^4$

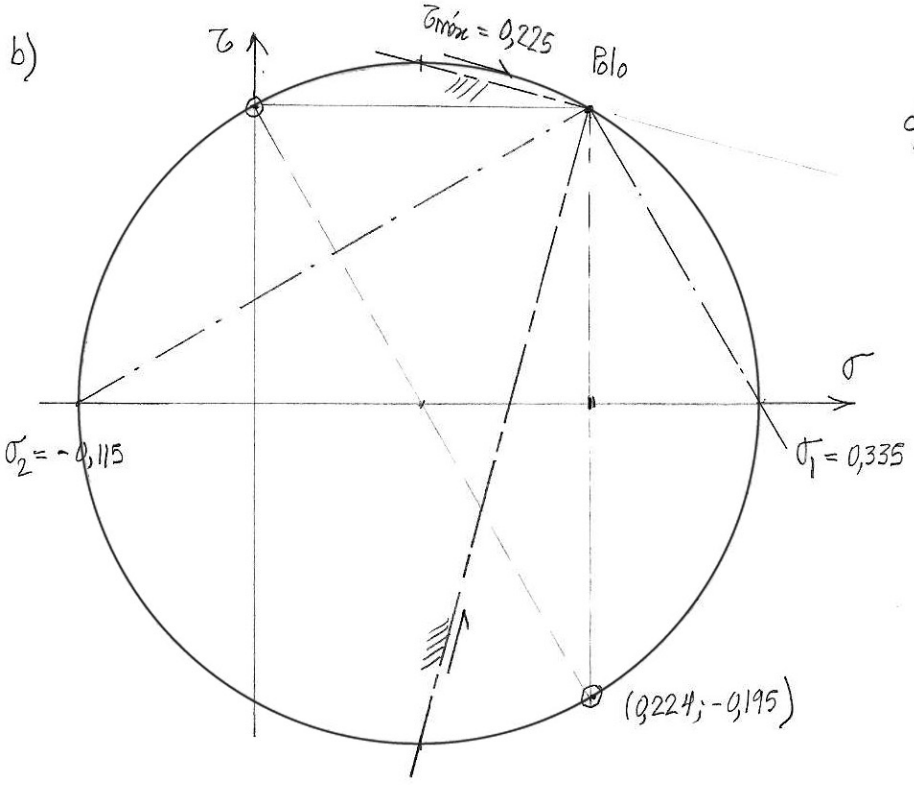
a) $\sigma_Q = \frac{N}{A} - \frac{M}{I_y} z = \frac{-40}{192} + \frac{2000}{23136} \times 5 = 0{,}224 \text{ MPa}$

$\tau_Q = \frac{V \bar{S}_y}{b I_y} = \frac{20 \times (18 \times 14 + 20 \times 10)}{2 \times 23136} = 0{,}195 \text{ MPa}$

$\bar{S}_y = 452 \text{ mm}^3$



b)



c) $\tau_{máx} = \sqrt{\left(\frac{0{,}224}{2}\right)^2 + 0{,}195^2}$

$= 0{,}225 \text{ MPa}$

$\sigma_{1,2} = \frac{0{,}224}{2} \pm 0{,}225 \quad \begin{matrix} 0{,}337 \\ -0{,}113 \end{matrix}$