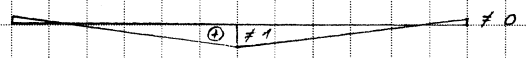
1) a) $V_m^{max} = -\frac{3Q}{4}$ bei $x = \frac{3l}{2}$

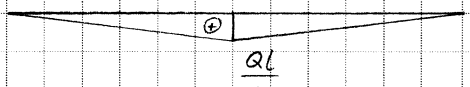
b) $H_S^{max} = -\frac{Q}{3}$ bei $x = 2l$

c) $N_n^{Ext.} = -\frac{\sqrt{2}\,Q}{3}$ bei $x = 2l$

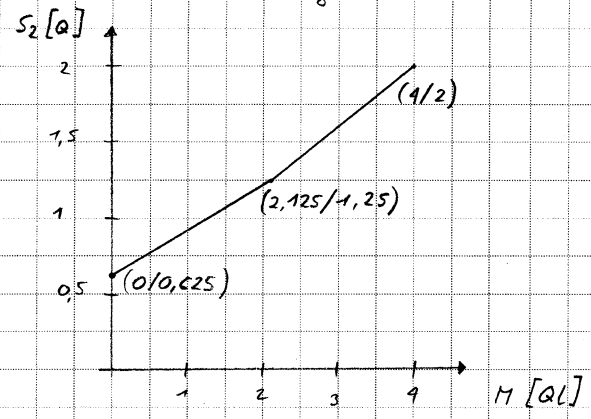
d) n_w :



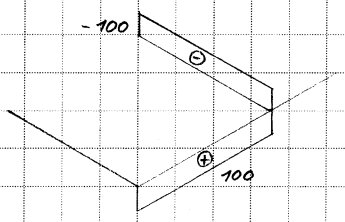
2) a) M :



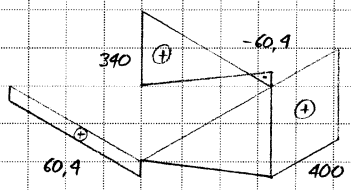
b)



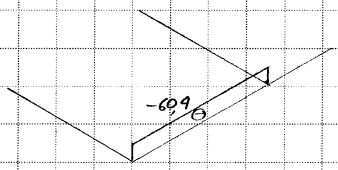
3) a) V_z [kN]:



M_y [kNm]:



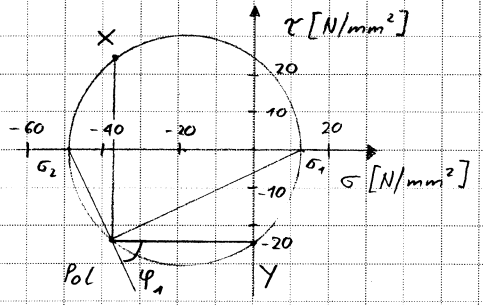
T [kNm]:



b) $w_z = 30,1$ mm

c) $\sigma_x = -38,0\ N/mm^2$ $\tau_{zx} = 25,2\ N/mm^2$

d)



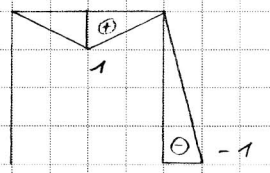
$\sigma_1 = 12,6\ N/mm^2$

$\sigma_2 = -50,6\ N/mm^2$

$\varphi_1 = 63,5°$

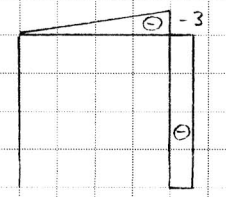
4) a) $Q_y = \frac{32 M_y}{35 l}$

b) $Q_u = \frac{M_y}{l}$ $\quad \underline{M(Q_u)}: [M_y]$



c) $\varphi_{pl} = \frac{M_y \cdot l}{2EI}$

d) $\underline{M_{res}}: \left[\frac{M_y}{16}\right]$

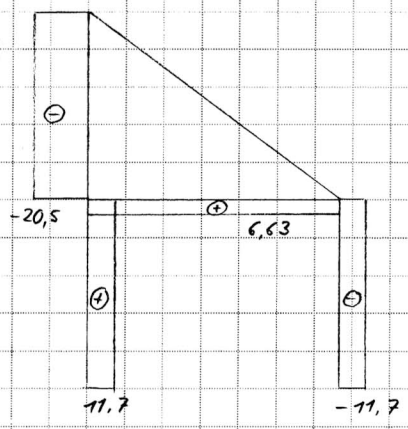


5) a) $M_{31}^{II} = -62,3$ kNm $\qquad N_{14}^{II} = 11,2$ kN

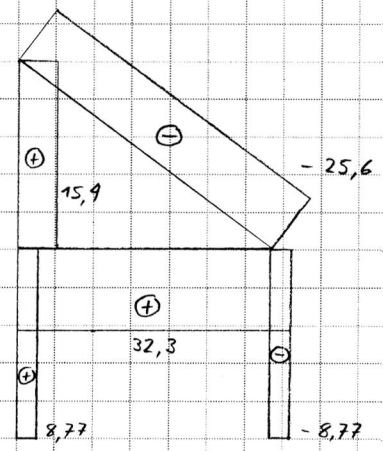
b) $\Delta l^\circ = -9,65$ mm $\qquad N_{14}^{II} = 15,9$ kN

6)

$\underline{V}$: $\left[10^{-3}\frac{EI}{l^2}\right]$



$\underline{N}$: $\left[10^{-3}\frac{EI}{l^2}\right]$



$\underline{M}$: $\left[10^{-3}\frac{EI}{l}\right]$