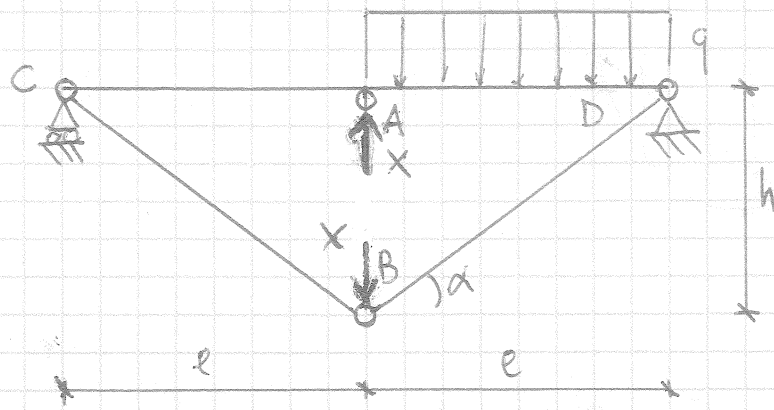
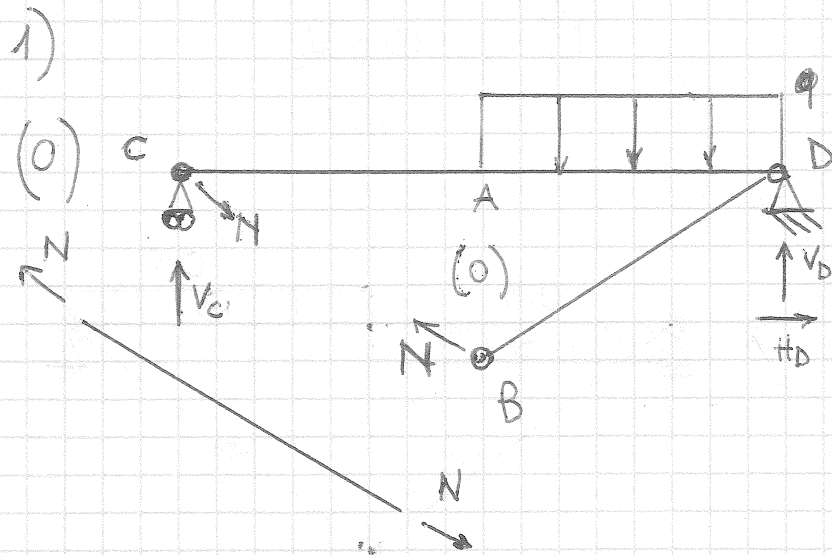
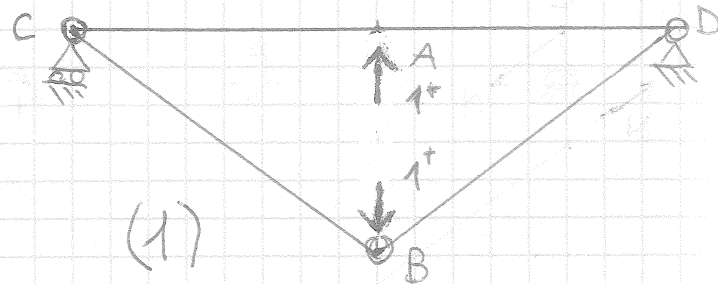
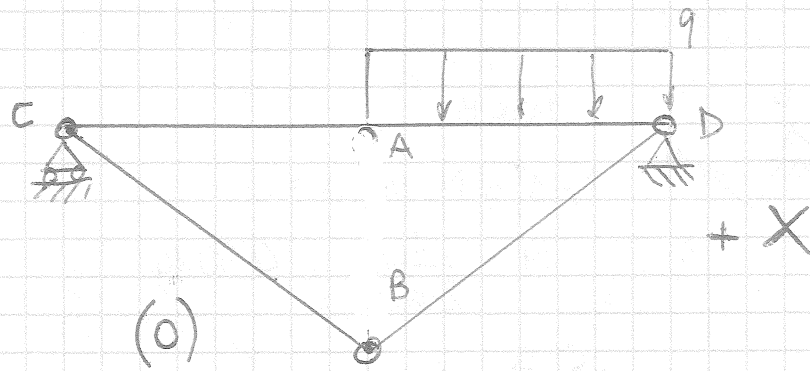
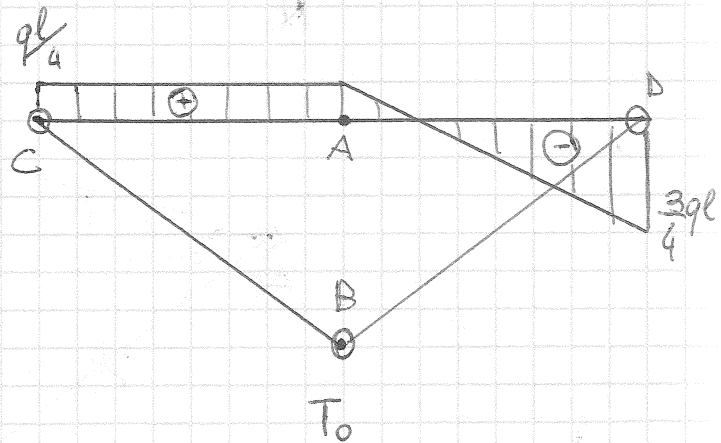
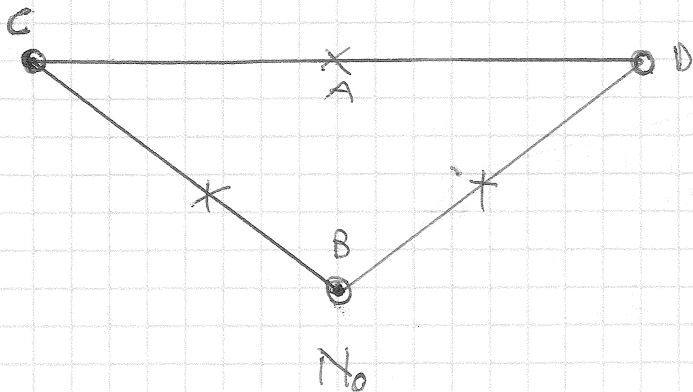


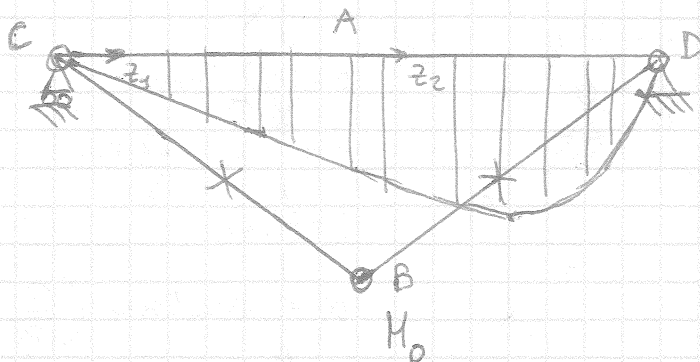


$q = 500 \text{ N/m}$
 $h = 2 \text{ m} = \frac{2}{3} l$
 $l = 3 \text{ m}$
 $\alpha = \arctan\left(\frac{2}{3}\right)$



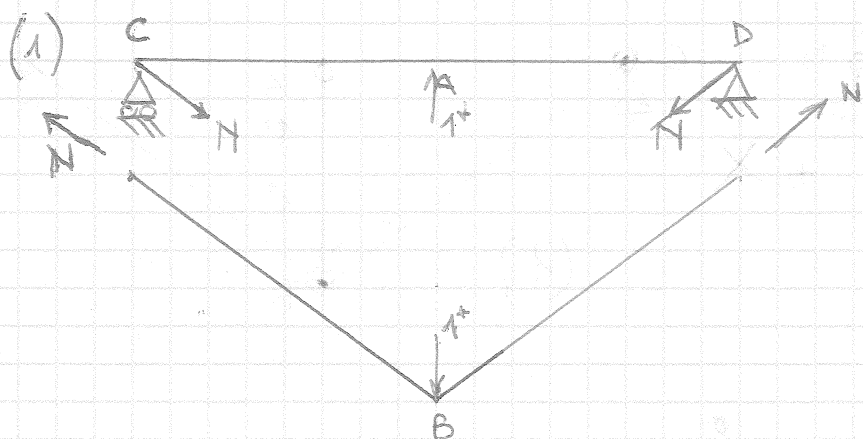
$D) N = 0$
 $\rightarrow H_D = 0$
 $C) V_D \cdot 2l - ql \left(\frac{3}{2}l\right) = 0$
 $V_D = \frac{3}{4}ql$
 $\uparrow) V_C = 2ql - \frac{3}{4}ql = \frac{1}{4}ql$





$$H_0(z_1) = \frac{qlz_1}{4}$$

$$H_0(z_2) = \frac{ql^2}{14} - \frac{qlz_2^2}{2} + \frac{qlz_2}{14}$$



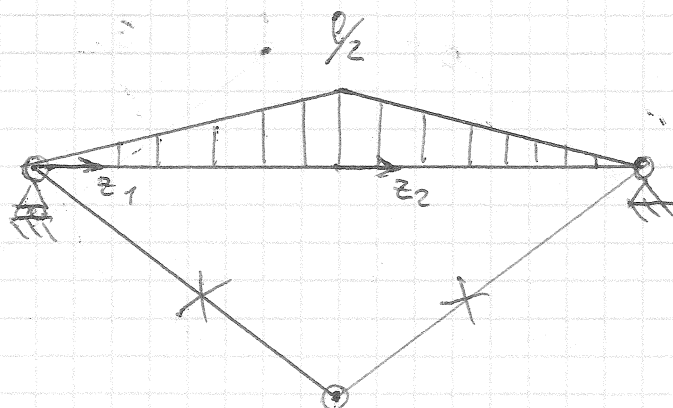
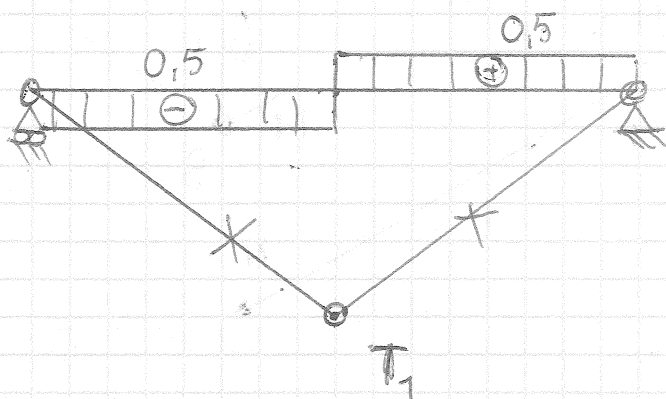
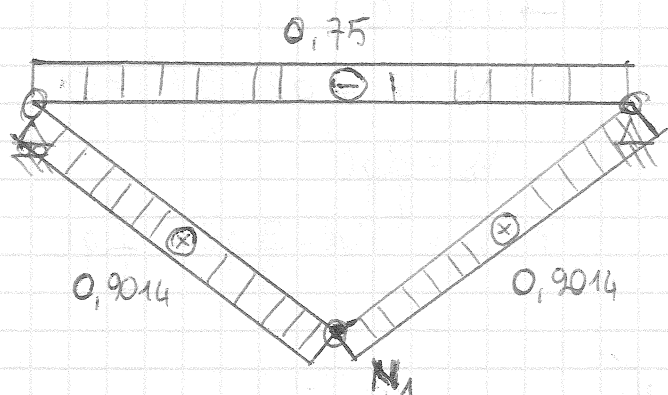
Node B

$$\uparrow) -1 \cdot 2N \cdot \sin \alpha = 0$$

$$N = \frac{1}{2 \sin \alpha} = 0,9014$$

$$\rightarrow) H_D = 0$$

$$\uparrow) V_D = 0 = V_C$$



$$H_0(z_1) = -N \cdot \sin \alpha \cdot z = -0,5 z$$

$$H_0(z_2) = -\frac{l}{2} + \frac{z}{2}$$

$$E = 2,1 \cdot 10^{11} \text{ Pa}$$

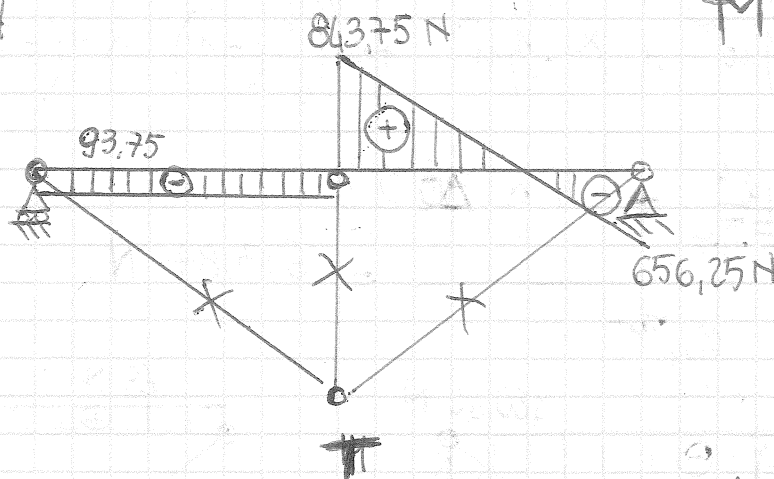
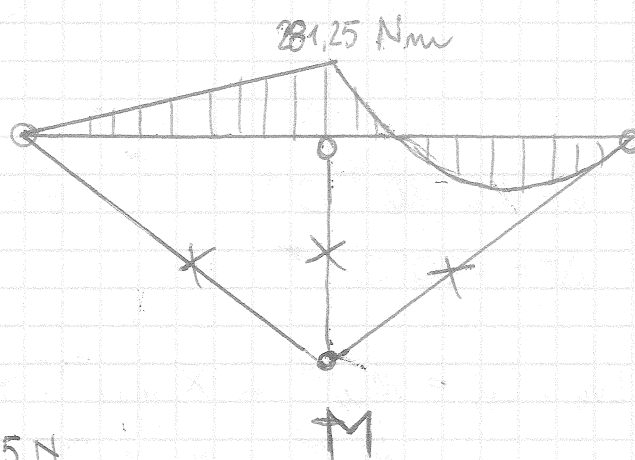
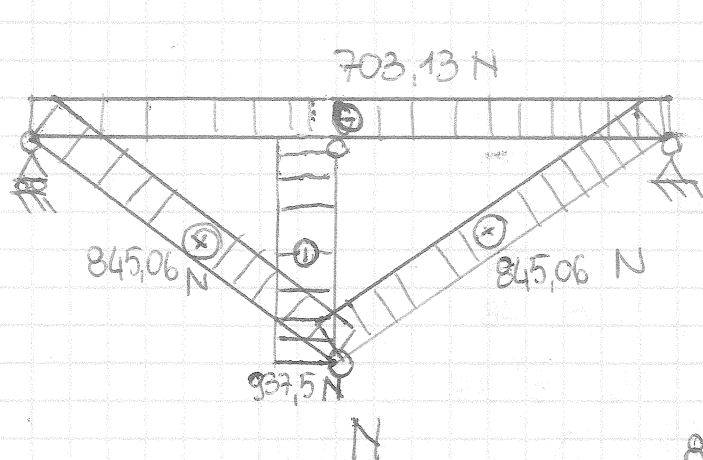
$$J_{IPE} = 8,69 \cdot 10^{-6} \text{ m}^4$$

$$M_{10} = \frac{1}{E J_{IPE}} \int_0^l \left(\frac{q l z}{4} \right) \left(-\frac{z}{2} \right) dz + \frac{1}{E J_{IPE}} \int_0^l \left(-\frac{q z^2}{2} + \frac{q l^2}{4} + \frac{q l z}{4} \right) \left(\frac{z}{2} - \frac{l}{2} \right) dz$$

$$= \frac{1}{E J_{IPE}} \left(-\frac{q l^4}{24} - \frac{q l^4}{16} \right) = -\frac{5}{48} \frac{q l^4}{E J_{IPE}}$$

$$M_{11} = \frac{1}{E J_{IPE}} \int_0^l \frac{z^2}{4} dz + \frac{1}{E J_{IPE}} \int_0^l \left(\frac{z}{2} - \frac{l}{2} \right)^2 dz = \frac{1}{E J_{IPE}} \left(\frac{l^3}{12} + \frac{l^3}{12} \right) = \frac{l^3}{6 E J_{IPE}}$$

$$X = -\frac{M_{10}}{M_{11}} = \frac{5}{48} \frac{q l^4}{E J_{IPE}} \cdot \frac{6 E J_{IPE}}{l^3} = 937,5 \text{ N}$$



$$2) M_{10}^{\text{Tot}} = M_{10}^{\text{Res}} + M_{10}^{\text{def.am}} = -\frac{5}{48} \frac{q l^4}{E J_{IPE}} + 0$$

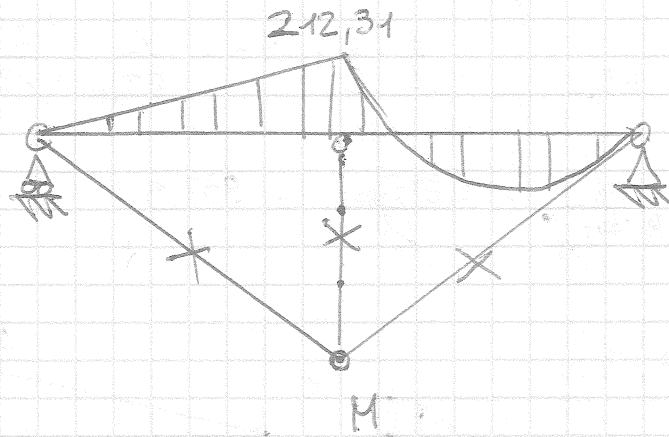
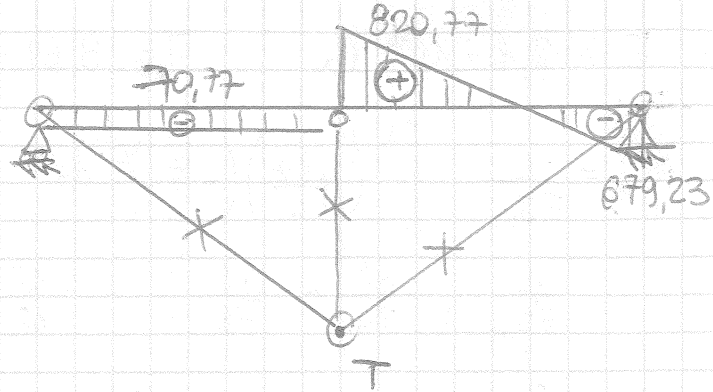
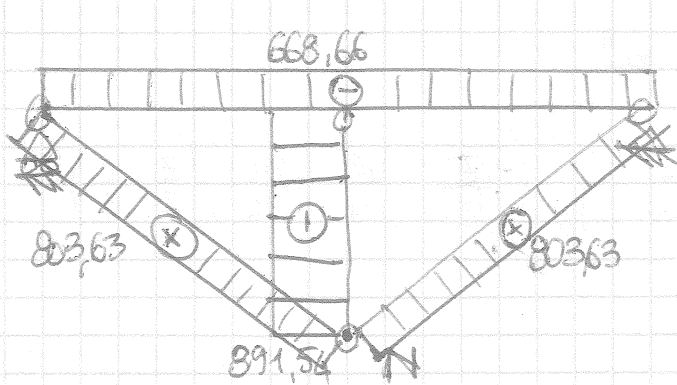
$$M_{11}^{\text{Tot}} = M_{11}^{\text{Res}} + M_{11}^{\text{def.am}} = \frac{l^3}{6 E J_{IPE}} + \int_{-10}^{22} \frac{0,75 z^2}{E A_{IPE}} dz + \int_0^l \frac{1}{E A_{IPE}} dz +$$

$$+ 2 \int_0^l \frac{0,9014 z^2}{E A_{TOND}} dz = \frac{l^3}{6 E J_{IPE}} + \frac{0,5625 \cdot 22}{E A_{IPE}} + \frac{0,8125 \cdot 22}{E A_{TOND} \cdot \cos \alpha} + \frac{l}{E A_{TOND}}$$

$$X^{\text{def.am}} = -\frac{M_{10}^{\text{Tot}}}{M_{11}} = 891,54 \text{ kN}$$

$$A_{TOND} = 3,1416 \cdot 10^{-4} \text{ m}^2$$

$$A_{IPE} = 201 \cdot 10^{-3} \text{ m}^2$$



3) $\alpha = 1,2 \cdot 10^{-5} \text{ } ^\circ\text{C}^{-1}$

$\Delta T = -30^\circ\text{C}$

$\epsilon^T = \alpha \cdot \Delta T$

$$L_{ve} = L_{vi} = M_{10}^{\text{TOT}} + X M_{11}^{\text{TOT}} + \int_0^h N_1 \cdot \epsilon^T dz$$

$$= M_{10}^{\text{TOT}} + X M_{11}^{\text{TOT}} + \int_0^h (-1) \cdot \alpha \cdot (-30) dz$$

$$X = \frac{\frac{5}{48} \frac{q l^4}{E J_{\text{IPE}}} + h \alpha (-30)}{1} = 613,87 \text{ N}$$

