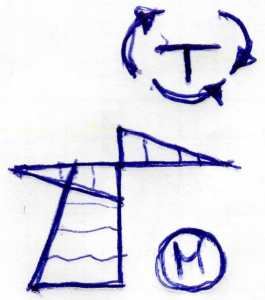
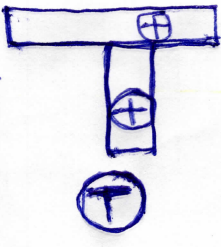
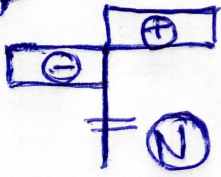
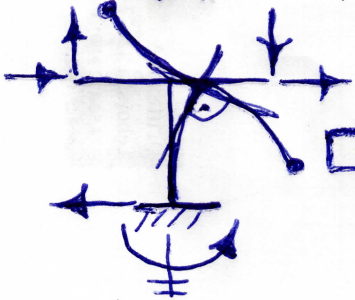
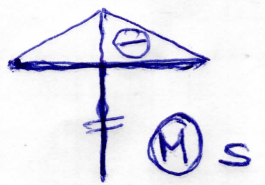
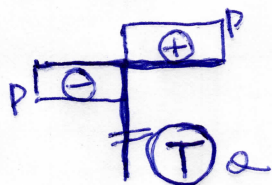
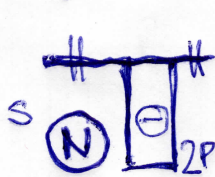
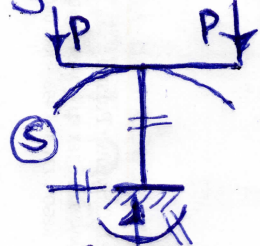
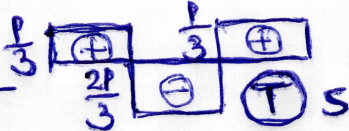
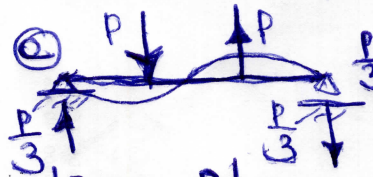
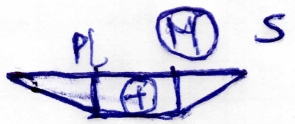
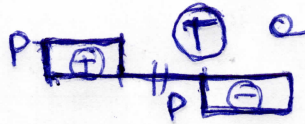
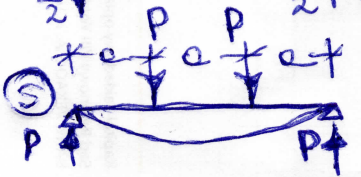
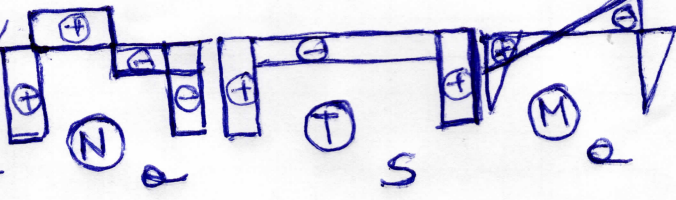
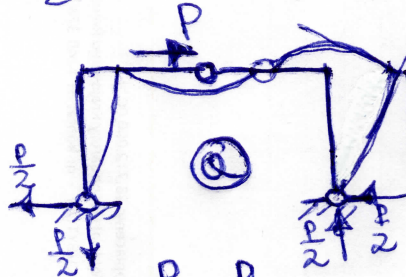
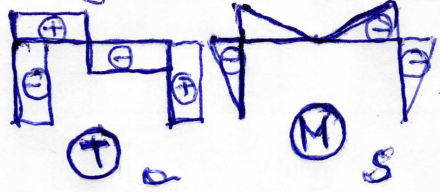
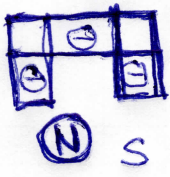
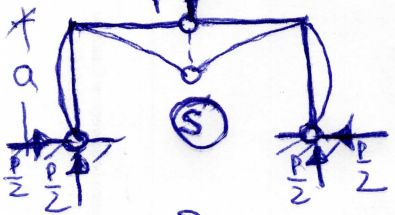


CW.

# SYMETRIA - ANISYMETRIA

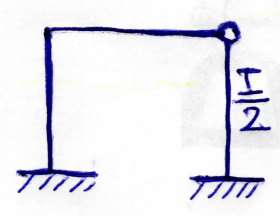
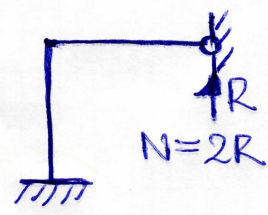
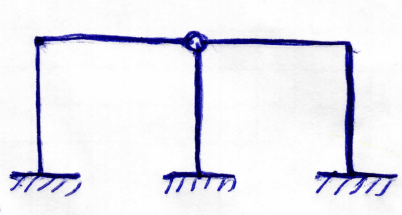
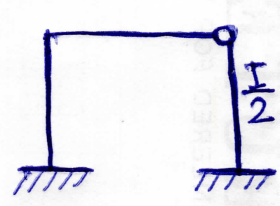
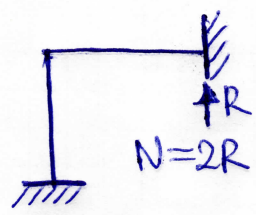
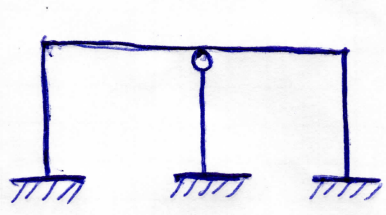
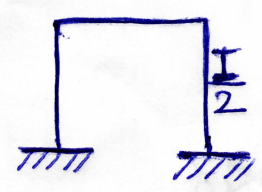
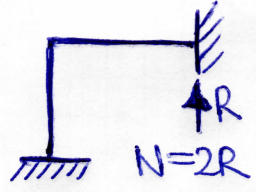
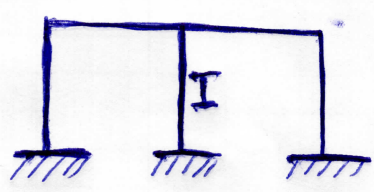
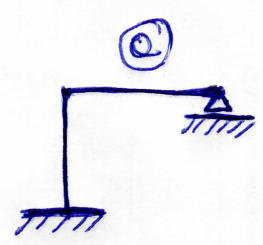
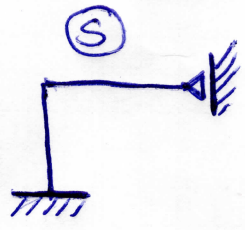
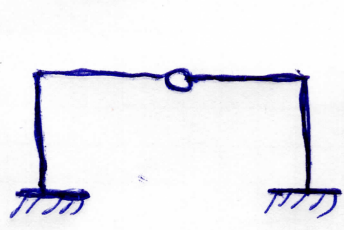
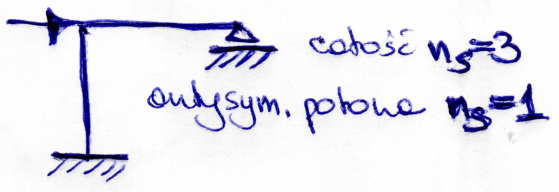
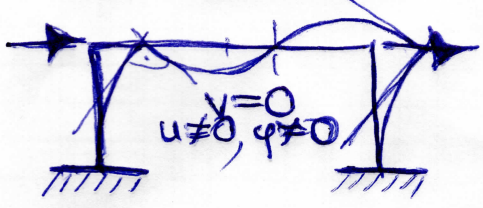
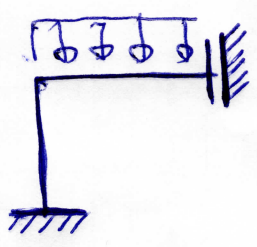
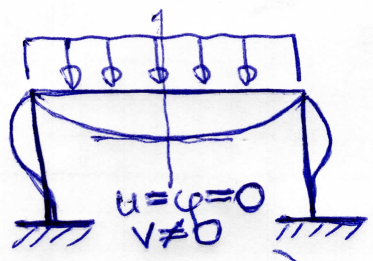
10/1

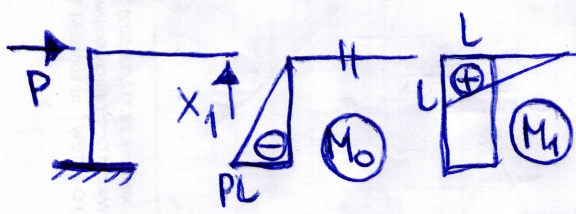
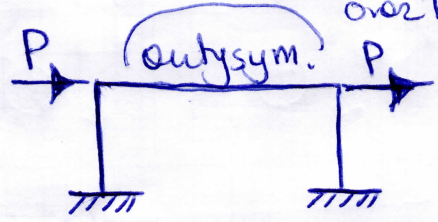
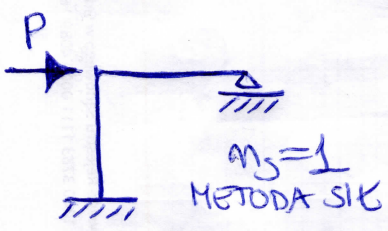
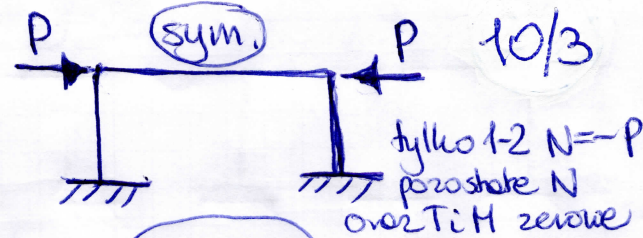
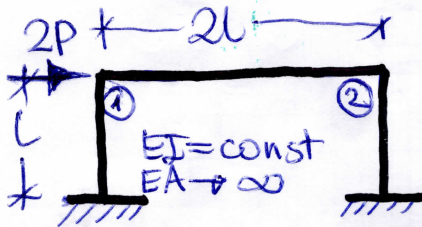
przykłady poglądu statycznego wyznaczalne



10/2

np.  $n_s = 3$  catose  
 sym, potowa  $n_s = 2$

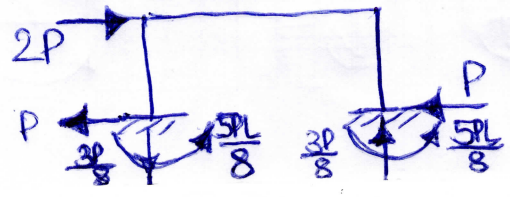
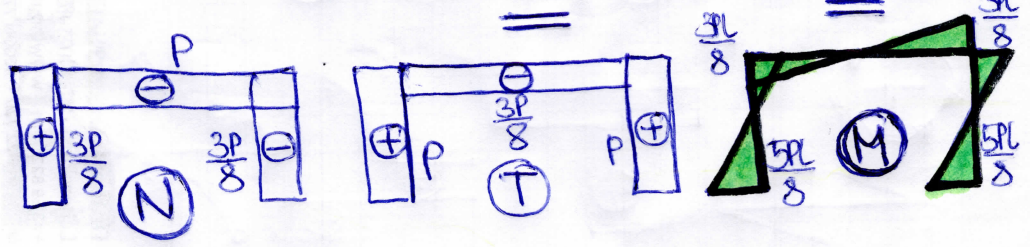
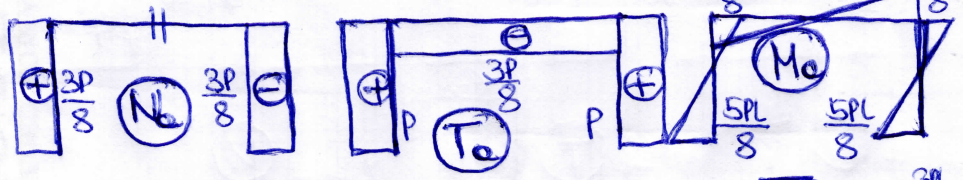
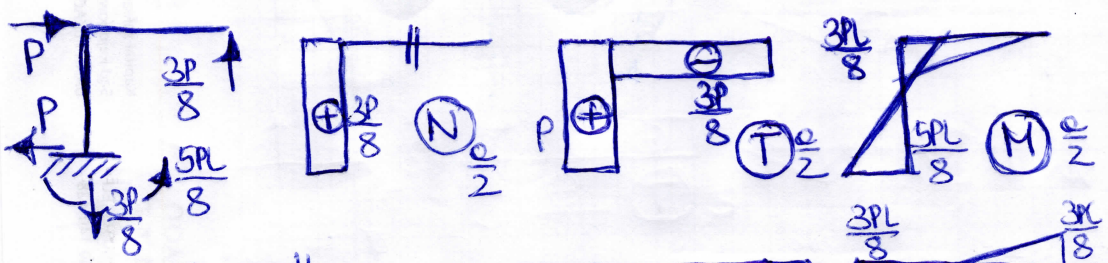


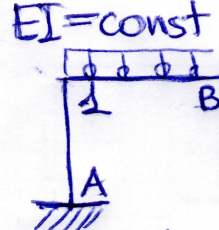
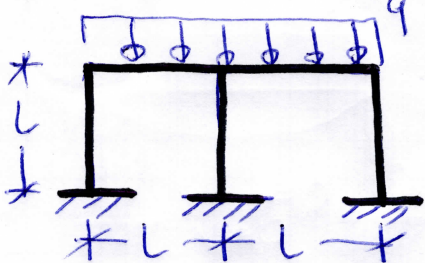


$$\delta_{10} = -\frac{1}{2} L \cdot PL \cdot L \cdot \frac{1}{EI} = -\frac{PL^3}{2EI}$$

$$\delta_{11} = \frac{1}{EI} (L \cdot L + \frac{1}{3} \cdot L \cdot L) = \frac{4L^3}{3EI}$$

$$X_1 = \frac{3}{8} P$$





$m_s = 1(\varphi)$

$$M_{1A} = \frac{4EI}{L} \varphi \quad 10/4$$

$$M_{1B} = -\frac{ql^2}{12} + \frac{4EI}{L} \varphi$$

$$M_{2A} = \frac{2EI}{L} \varphi \quad M_{2B} = \frac{ql^2}{12} + \frac{2EI}{L} \varphi$$

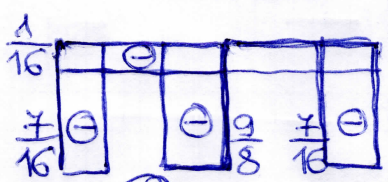
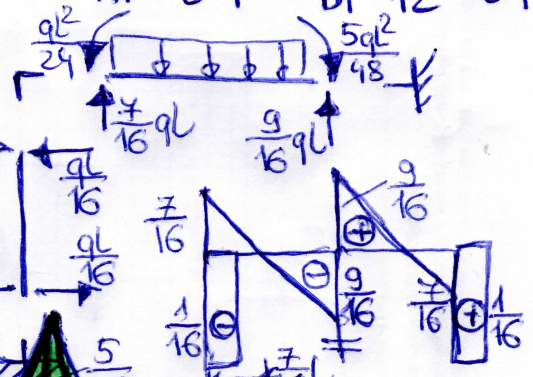
$$\sum M_i = 0 \Rightarrow \varphi = \frac{ql^3}{96EI}$$

$$M_{1A} = \frac{ql^2}{24}$$

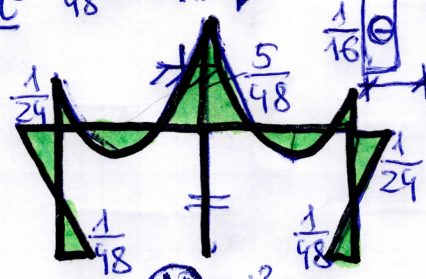
$$M_{1B} = -\frac{ql^2}{12} + \frac{ql^2}{24} = -\frac{ql^2}{24}$$

$$M_{2A} = \frac{ql^2}{48}$$

$$M_{2B} = \frac{ql^2}{12} + \frac{ql^2}{48} = \frac{5ql^2}{48}$$

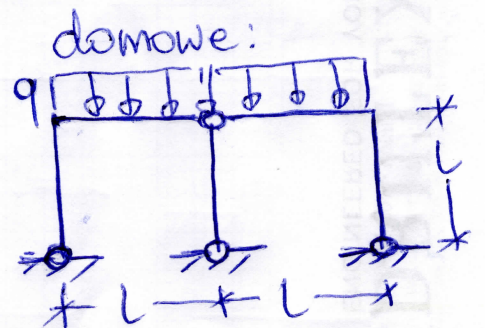
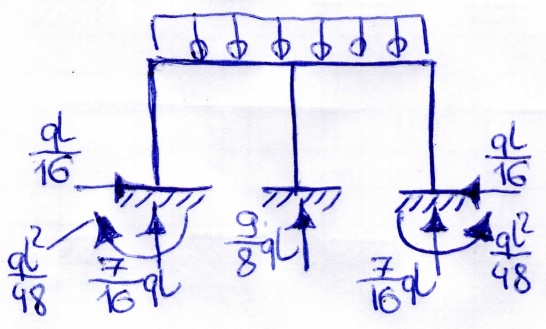


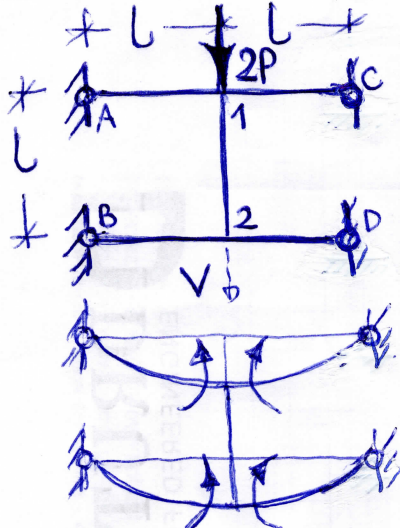
(N) x ql



(M) x ql^2

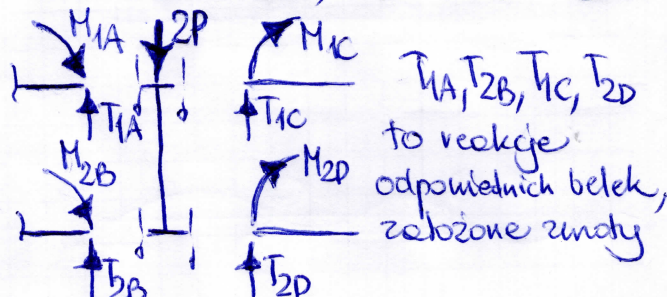
(T) x ql





ze względu na symetrię  $\varphi_1 = \varphi_2 = 0$   
 odcinek 1-2 prostoliniowy  
 (symetri. stan pręężenia)  $\eta_3 = 1(v)$   
 brak momentów wyjściowych

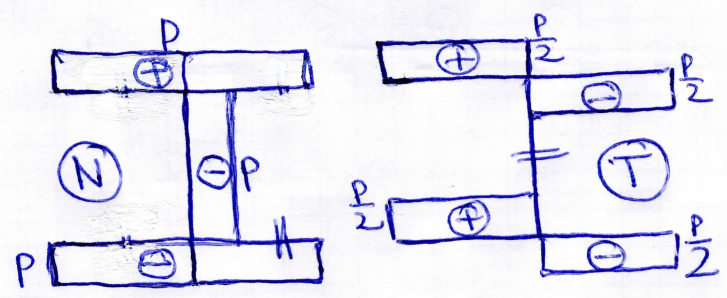
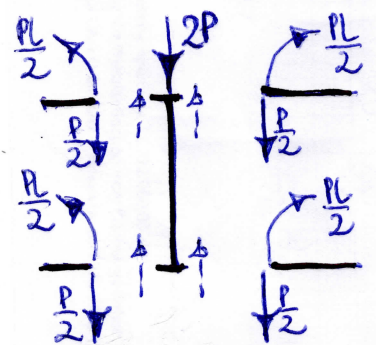
$M_{1A} = M_{2B} = -\frac{3EI}{L^2}v, M_{1C} = M_{2D} = \frac{3EI}{L^2}v$



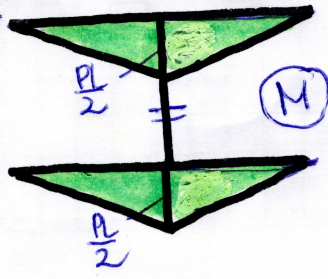
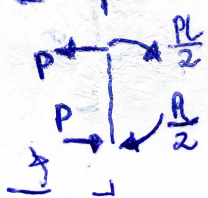
$T_{1A} = \frac{M_{1A}}{L} = -\frac{3EI}{L^3}v$   
 $T_{2B} = \frac{M_{2B}}{L} = -\frac{3EI}{L^3}v$   
 $T_{1C} = -\frac{M_{1C}}{L} = -\frac{3EI}{L^3}v$   
 $T_{2D} = -\frac{M_{2D}}{L} = -\frac{3EI}{L^3}v$

$\sum P_y^{(1-2)} = 0 \Rightarrow 2P + T_{1A} + T_{2B} + T_{1C} + T_{2D} = 0$   
 $2P - \frac{12EI}{L^3}v = 0 \Rightarrow v = \frac{PL^3}{6EI}$

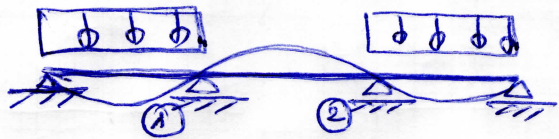
stąd  $M_{1A} = M_{2B} = -\frac{PL}{2}$   
 $M_{1C} = M_{2D} = \frac{PL}{2}$



DO SPORZĄDZENIA  
 WYKRESÓW NA ODC.  
 A-1-C i B-2-D  
 SCHEMAT  
 PŁOBY



wykorzystanie symetri układu i symetri /  
 antysymetri obciążenie bez podziału układu na połowy



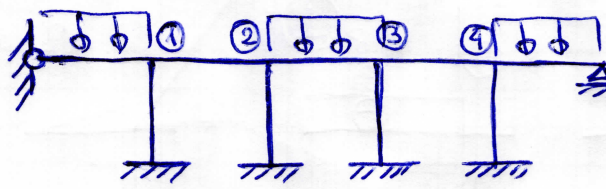
MS: gupone neodlirbowa  
 $X_1 = X_2 = X$

MP:  $\varphi_2 = -\varphi_1$

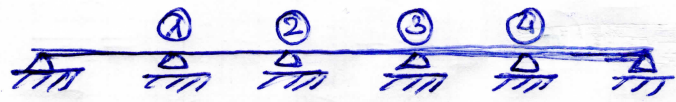


MS:  $X_2 = -X_1$

MP:  $\varphi_2 = \varphi_1$



MP:  $\varphi_4 = -\varphi_1$   
 $\varphi_3 = -\varphi_2$



MP: jak wyżej  
 MS:  $X_4 = X_1 = Y$   
 $X_3 = X_2 = Z$

$$n_s = 2(Y, Z)$$