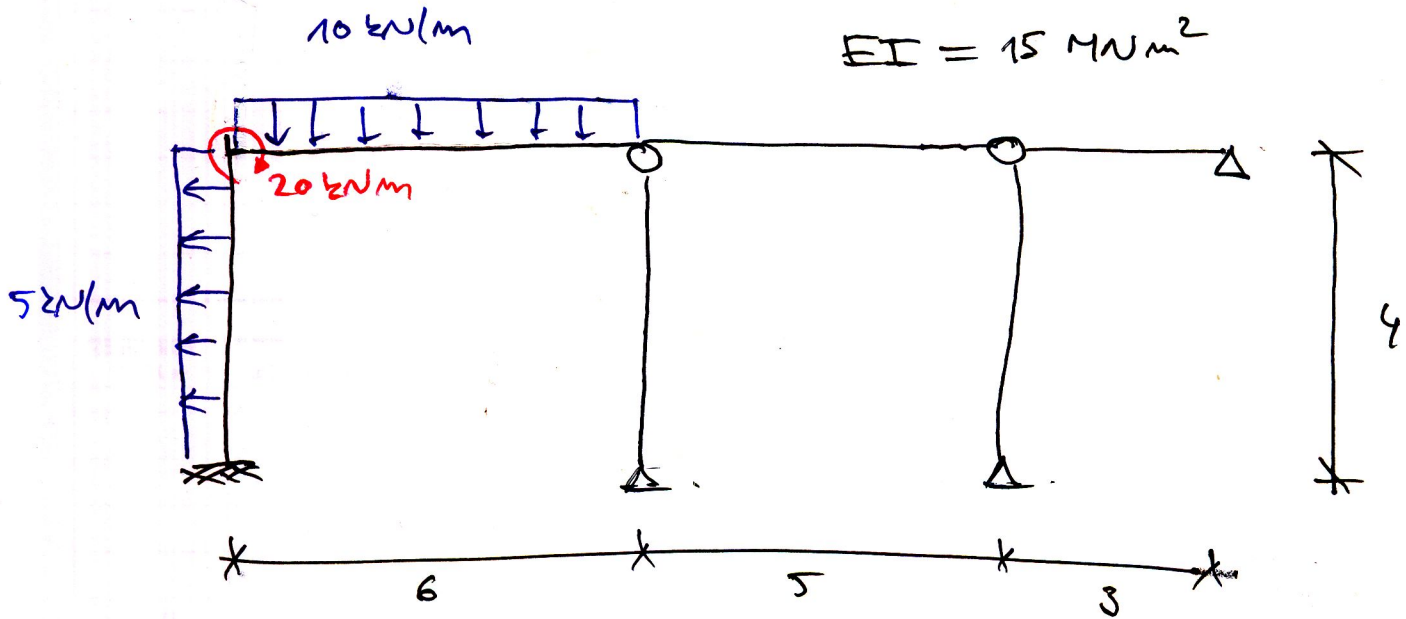
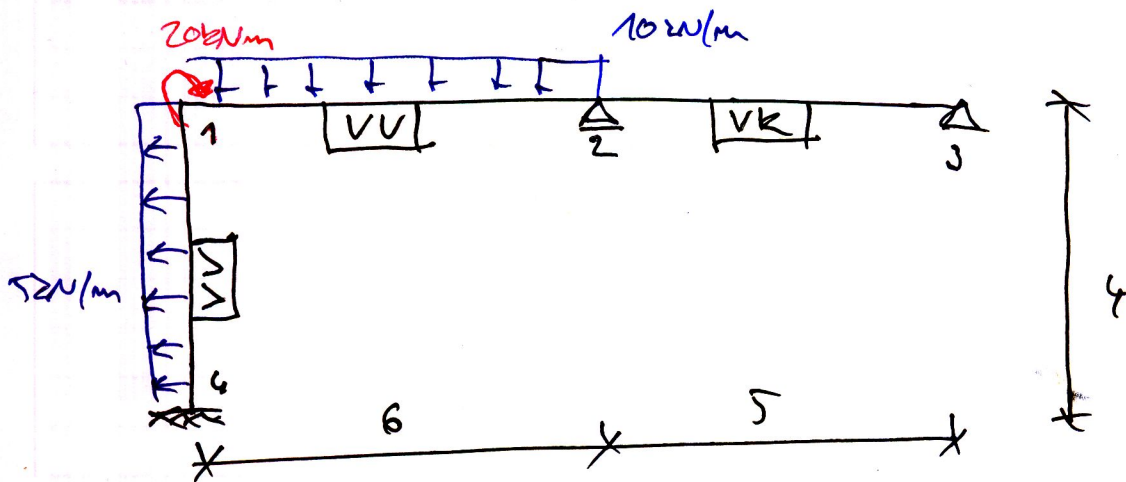


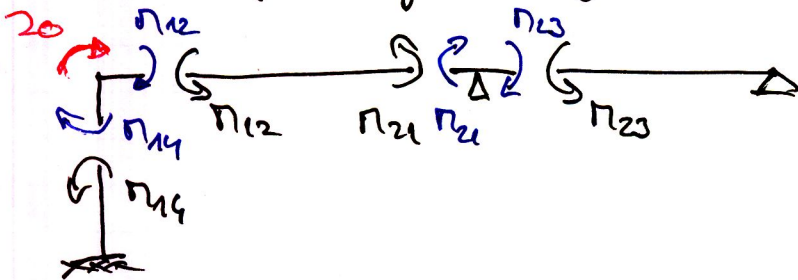
1) Vyřešte problémy vnitřních sil pomocí zDŮ.



→ konstrukce zjednodušené:



→ momentové podmínky rovnováhy střechy 1 a 2



$$\pi_{12} + \pi_{14} + 20 = 0$$

$$\pi_{21} + \pi_{23} = 0$$

$$\Pi_{12} = \frac{10 \cdot 6^2}{12} + \frac{2 \cdot 15}{6} \cdot [2\varphi_1 + \varphi_2] = 30 + 10\varphi_1 + 5\varphi_2 = 14,22 \text{ Nm}$$

$$\Pi_{14} = \frac{5 \cdot 4^2}{12} + \frac{2 \cdot 15}{4} \cdot 2 \cdot \varphi_1 = 6,67 + 15\varphi_1 = -34,22 \text{ kNm}$$

$$\Pi_{21} = -\frac{10 \cdot 6^2}{12} + \frac{2 \cdot 15}{6} \cdot [\varphi_1 + 2\varphi_2] = -30 + 5\varphi_1 + 10\varphi_2 = -20,667 \text{ kNm}$$

$$\Pi_{23} = \frac{3 \cdot 15}{5} \cdot \varphi_2 = 9\varphi_2 = 20,667 \text{ kNm}$$

---

$$(1) \quad 25\varphi_1 + 5\varphi_2 = -56,67$$

$$-56,67 - 5\varphi_2 = \frac{30 - 15\varphi_2}{5}$$

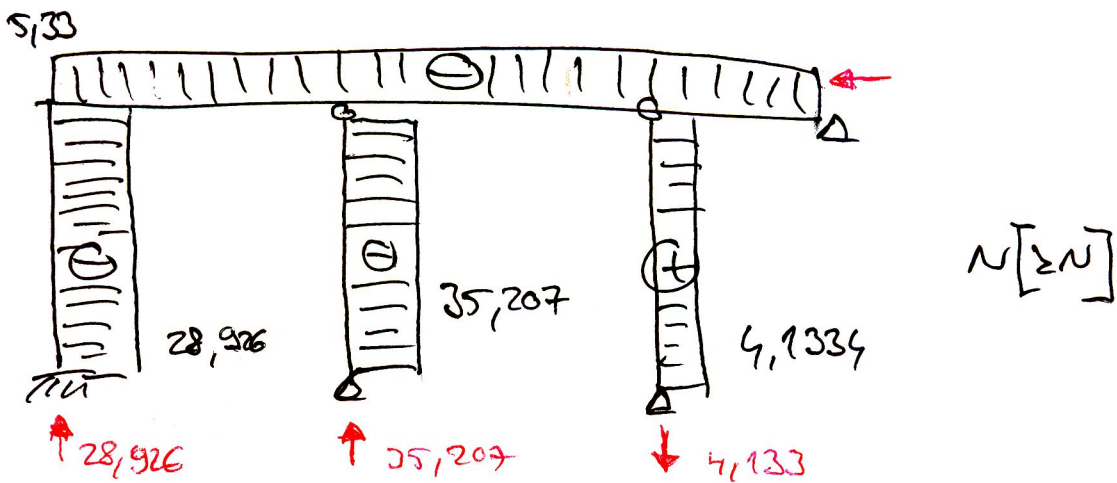
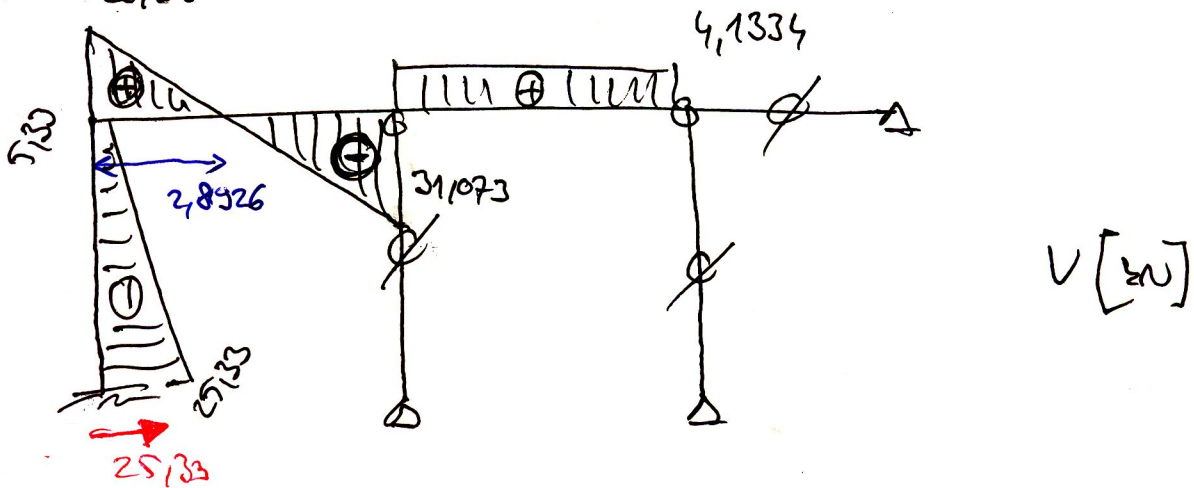
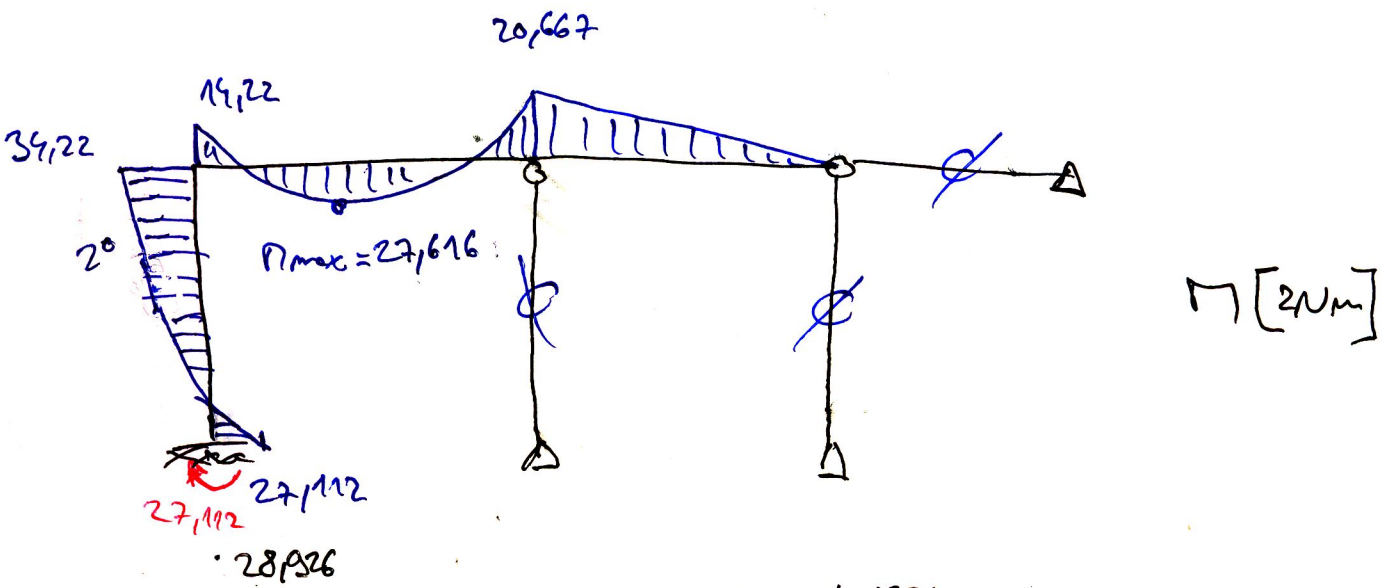
$$(2) \quad 5\varphi_1 + 19\varphi_2 = 30$$

$$-56,67 - 5\varphi_2 = 150 - 95\varphi_2$$

$$90\varphi_2 = 206,67$$

$$\left. \begin{array}{l} \varphi_2 = 2,2963 \text{ mrad} \\ \varphi_1 = -2,7259 \text{ mrad} \end{array} \right\}$$

$$\Pi_{41} = -\frac{5 \cdot 4^2}{12} + \frac{2 \cdot 15}{4} \cdot \varphi_1 = -27,112 \text{ Nm}$$



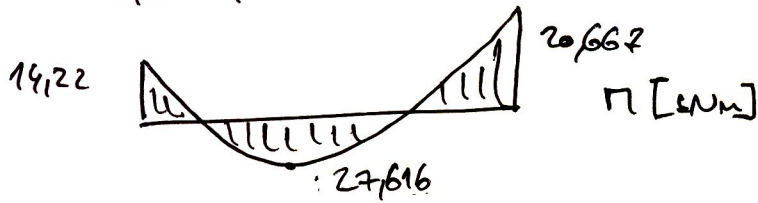
$14,22$   
 $10 \text{ kN/m}$   
 $20,667$   
 $6$   
 $A$   
 $B$   
 $A = \frac{14,22 - 20,667 + 10 \cdot 6 \cdot 3}{6} = 28,926 \text{ kN}$

$B = 31,073 \text{ kN}$

$27,112$   
 $34,22$   
 $5 \text{ kN}$   
 $4$   
 $A$   
 $B$   
 $A = -\frac{27,112 + 34,22 + 5 \cdot 4 \cdot 2}{4} = 25,33 \text{ kN}$

$B = 7,33 \text{ kN}$

Průhyb v místě max. momentu



1) Příklad - PRPE

$$M(x) = -14,22 + 20,926x - \frac{10x^2}{2} = EI \theta(x) = -EI w''(x)$$

$$w''(x) = \frac{1}{EI} [5x^2 - 20,926x + 14,22]$$

$$w'(x) = \frac{1}{EI} \left[ \frac{5x^3}{3} - \frac{20,926x^2}{2} + 14,22x \right] + C_1$$

$$C_1 = 2,7259$$

$$w(x) = \frac{1}{EI} \left[ \frac{5x^4}{12} - \frac{20,926x^3}{6} + \frac{14,22x^2}{2} \right] + 2,7259x + C_2$$

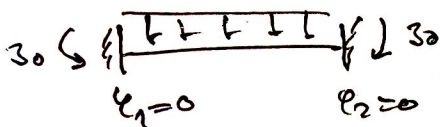
$$C_2 = 0$$

maximální průhyb pro  $x = 2,8926 \text{ m}$

$$w(2,8926) = \underline{\underline{6,017 \text{ mm}}}$$

kontrola  $w(6) = 0$

2) Příklad - superpozice



$$M(x) = -30 + 30x - \frac{10x^2}{2}$$

$$w(x) = \left[ \frac{10x^4}{24} - \frac{30x^3}{6} + \frac{30x^2}{2} \right] \cdot \frac{1}{EI} \quad w(2,8926) = 2,2442 \text{ mm}$$

$$w^e(x) = -e_1 \cdot L \left( \xi^3 - 2\xi^2 + \xi \right) - e_2 \cdot L \left( \xi^3 - \xi^2 \right) \quad \xi = \frac{x}{L} \quad \text{pro } x = 2,8926 \quad \xi = 0,4821$$

$$w^e(2,8926) = 2,7259 \cdot 6 \cdot (0,4821^3 - 2 \cdot 0,4821^2 + 0,4821) - 2,2963 \cdot 6 \cdot (0,4821^3 - 0,4821^2) = 3,7733 \text{ mm}$$

$$w^1 + w^e = 2,2442 + 3,7733 = \underline{\underline{6,01758 \text{ mm}}}$$