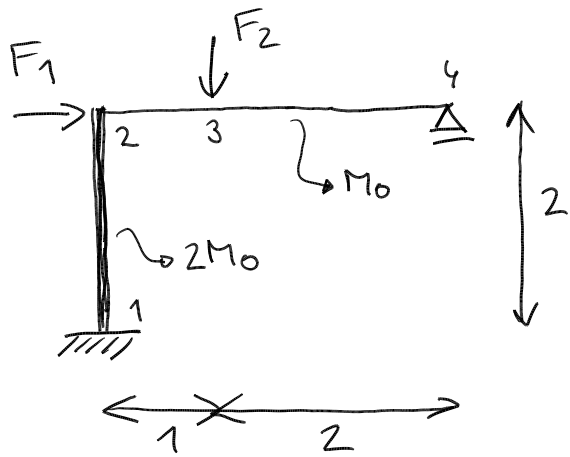
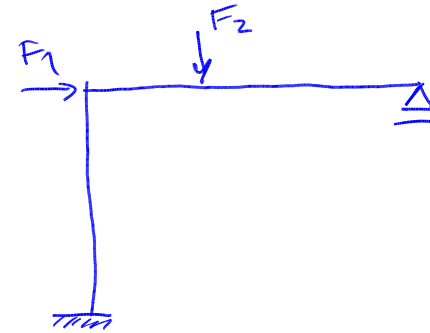
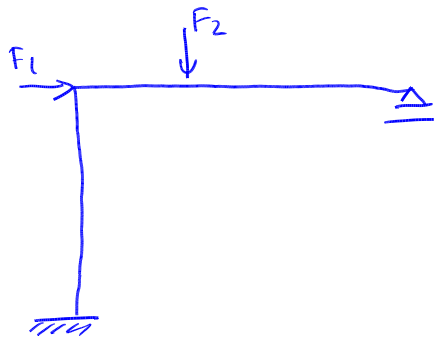
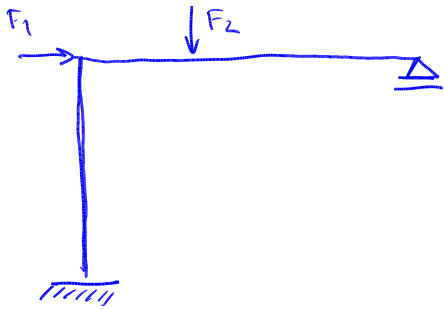


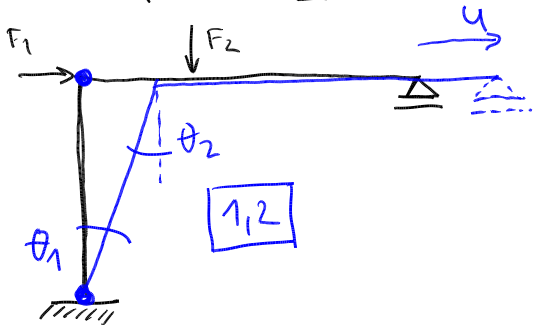
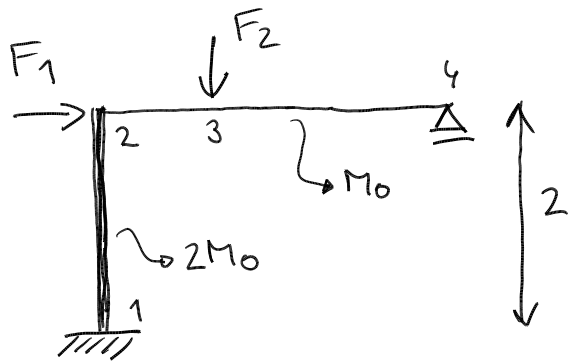
→ Analyza vseh kinematidy prapustny'ch mehanizmü



→ Analýza všech kinematicky přípustných mechanismů

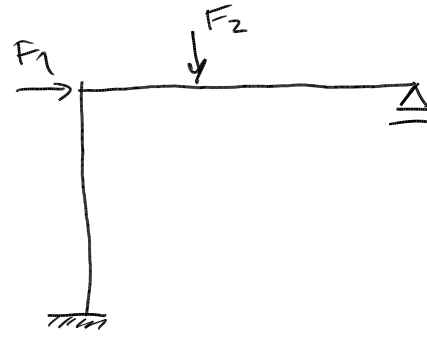
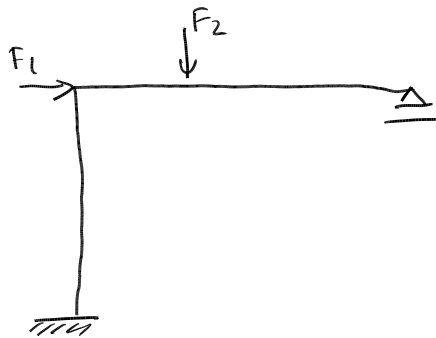
— konstrukce 1x SN → 2 plast. klaby } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3

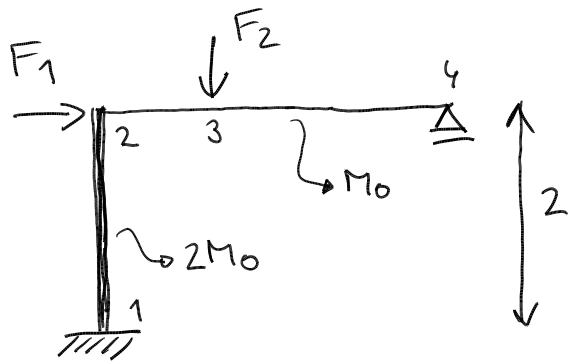




→ Analýza všech kinematiky přípustných mechanismů

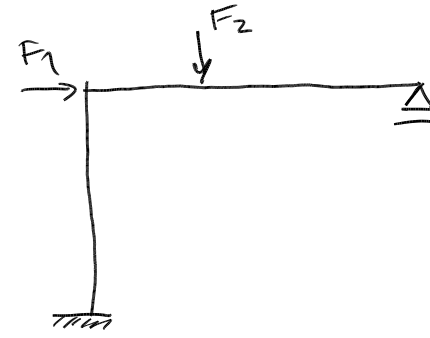
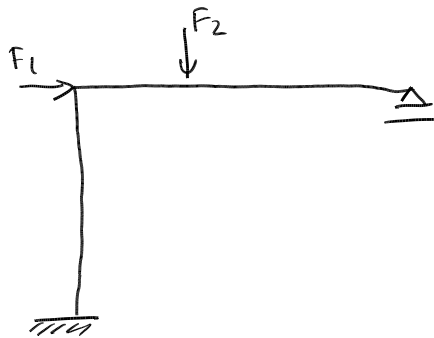
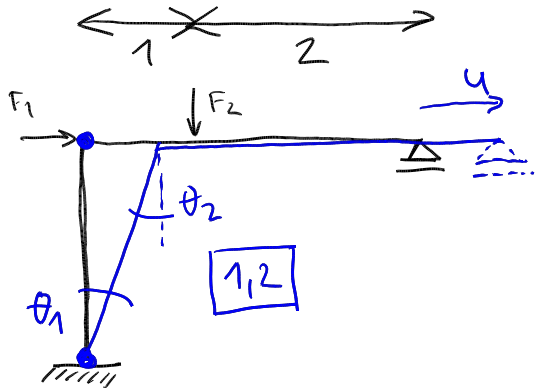
— konstrukce 1x SN → 2 plast. klady } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3

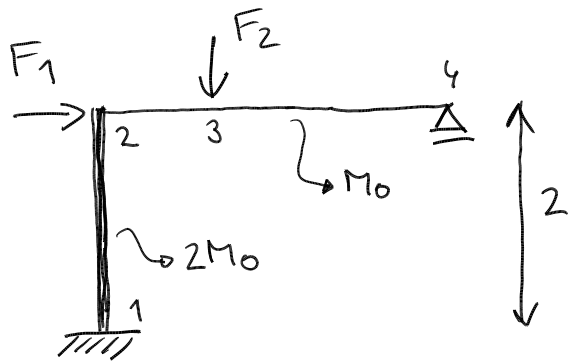




→ Analýza všech kinematiky přípustných mechanismů

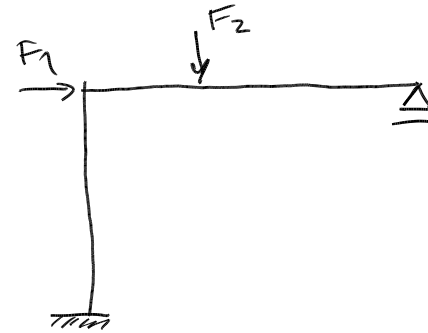
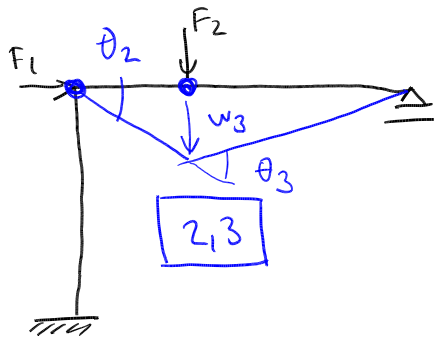
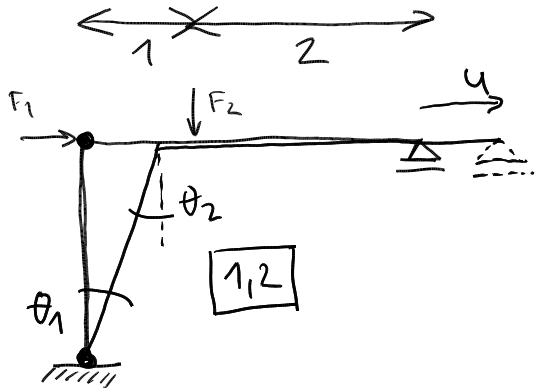
— konstrukce 1x SN → 2 plast. klady } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3

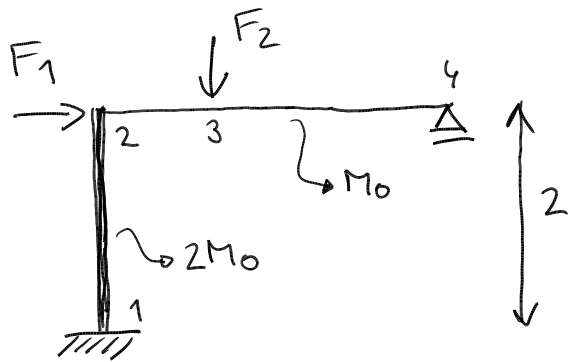




→ Analýza všech kinematiky přípustných mechanismů

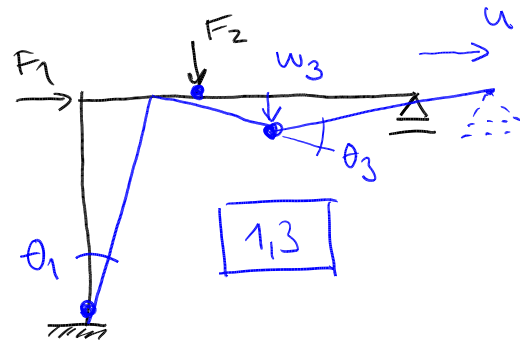
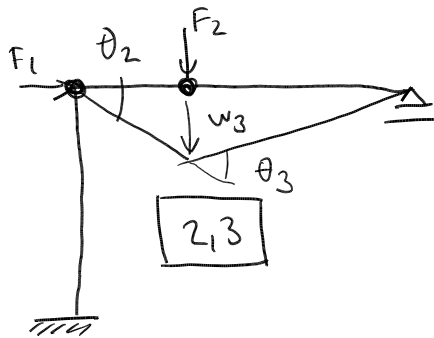
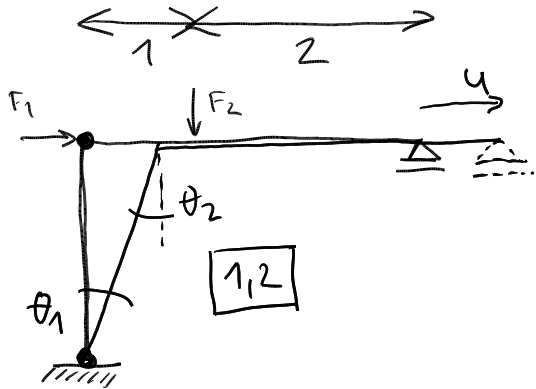
— konstrukce 1x SN → 2 plast. klady } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3

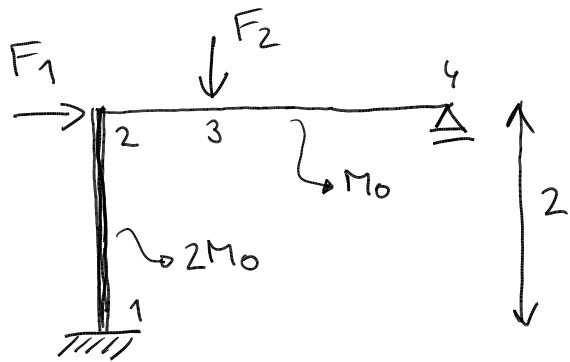




→ Analýza všech kinematiky přípustných mechanismů

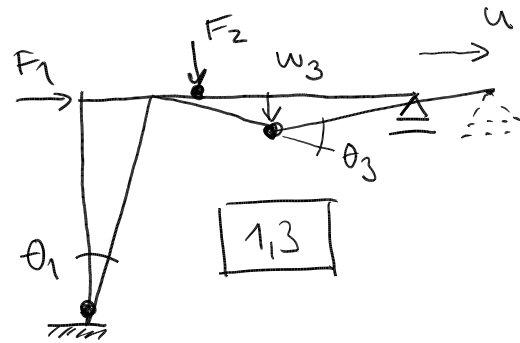
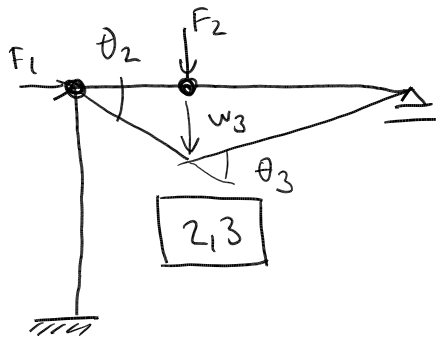
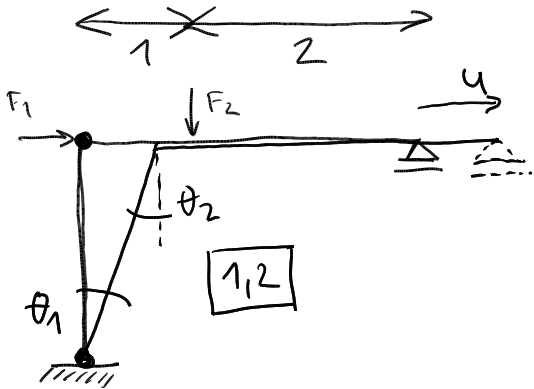
— konstrukce 1x SN → 2 plast. klaby } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3





→ Analýza všech kinematiky přípustných mechanismů

— konstrukce 1x SN → 2 plast. klaby } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3



$$F_{ext} = F_1 \cdot \dot{u} \cdot \mu$$

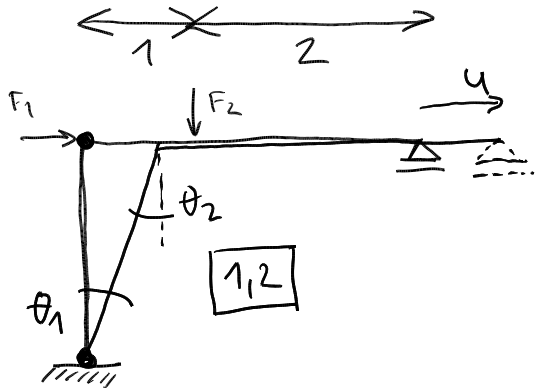
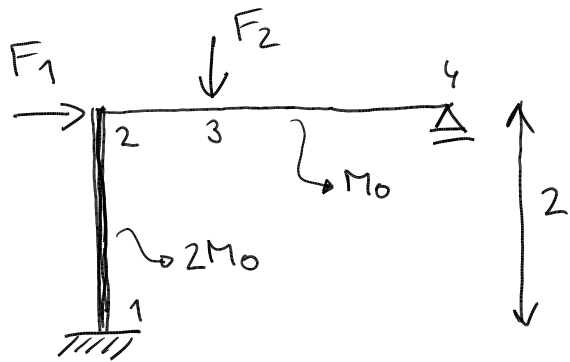
$$D_{int} = 2M_0 \dot{\theta}_1 + M_0 \dot{\theta}_2$$

$\hookrightarrow \dot{u} \quad \hookrightarrow \dot{u} \frac{1}{2}$









$$F_{ext} = F_1 \cdot \dot{u} \cdot \mu$$

$$D_{int} = 2M_0 \dot{\theta}_1 + M_0 \dot{\theta}_2$$

$\hookrightarrow \frac{\dot{u}}{2} \quad \hookrightarrow \frac{\dot{u}}{2}$

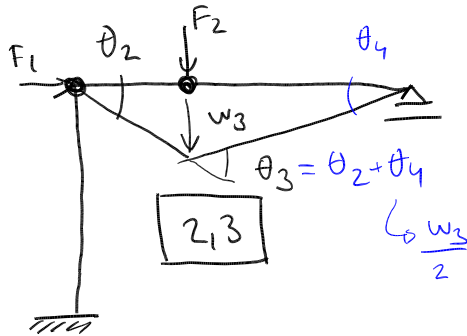
$$F_{ext} = D_{int}$$

$$F_1 \frac{\dot{u}}{2} \mu = \frac{3M_0 \dot{u}}{2}$$

$$\rightarrow \mu = \frac{3M_0}{2F_1} = \mu_{12}$$

→ Analýza všech kinematiky přípustných mechanismů

— konstrukce 1x SN → 2 plast. klady } 3 možné mechanismy  
 — 3 kritické průřezy } 1,2; 1,3; 2,3



$$F_{ext} = F_2 \dot{w}_3 \cdot \mu$$

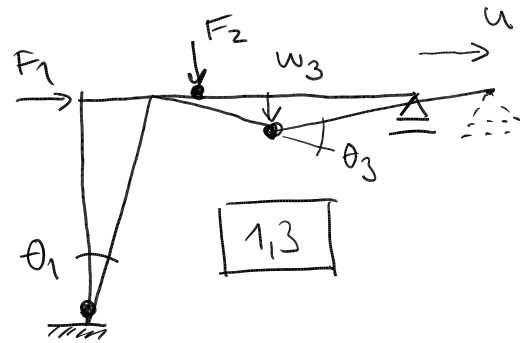
$$D_{int} = \dot{\theta}_2 M_0 + \dot{\theta}_3 M_0 = \frac{5}{2} M_0 \dot{w}_3$$

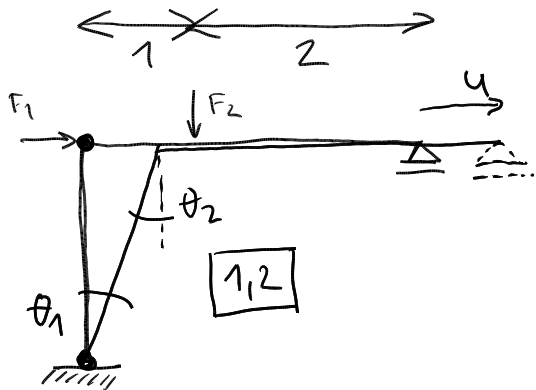
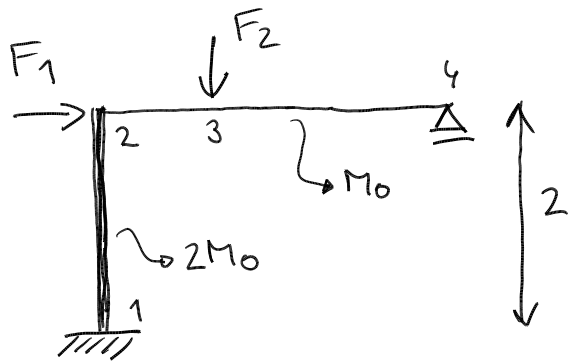
$\hookrightarrow \frac{\dot{w}_3}{1} \quad \hookrightarrow \frac{\dot{w}_3}{2} + \frac{\dot{w}_3}{1}$

$$F_{ext} = D_{int}$$

$$F_2 \dot{w}_3 \mu = \frac{5}{2} M_0 \dot{w}_3$$

$$\rightarrow \mu = \frac{5M_0}{2F_2} = \mu_{23}$$





$$F_{ext} = F_1 \cdot \dot{u} \cdot \mu$$

$$D_{int} = 2M_0 \dot{\theta}_1 + M_0 \dot{\theta}_2$$

$\hookrightarrow \frac{\dot{u}}{2}$        $\hookrightarrow \frac{\dot{u}}{2}$

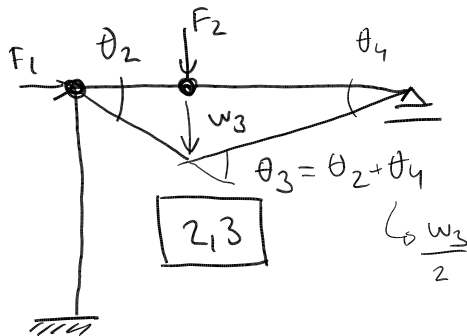
$$F_{ext} = D_{int}$$

$$F_1 \frac{\dot{u}}{2} \mu = \frac{3M_0 \dot{u}}{2}$$

$$\rightarrow \mu = \frac{3M_0}{2F_1} = \mu_{12}$$

→ Analýza všech kinematiky přípustných mechanismů

— konstrukce 1x SN → 2 plast. klady } 3 možné mechanismy  
 — 3 kritické průřezy                    1,2; 1,3; 2,3



$$F_{ext} = F_2 \dot{w}_3 \cdot \mu$$

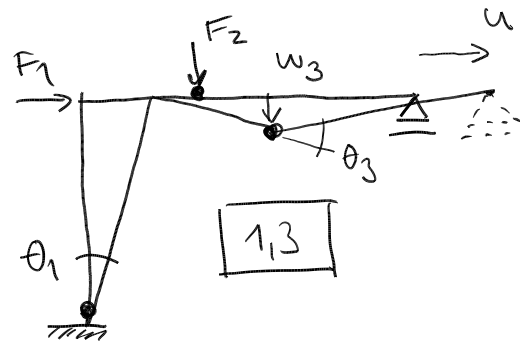
$$D_{int} = \dot{\theta}_2 M_0 + \dot{\theta}_3 M_0 = \frac{5}{2} M_0 \dot{w}_3$$

$\hookrightarrow \frac{\dot{w}_3}{1}$        $\hookrightarrow \frac{\dot{w}_3}{2} + \frac{\dot{w}_3}{1}$

$$F_{ext} = D_{int}$$

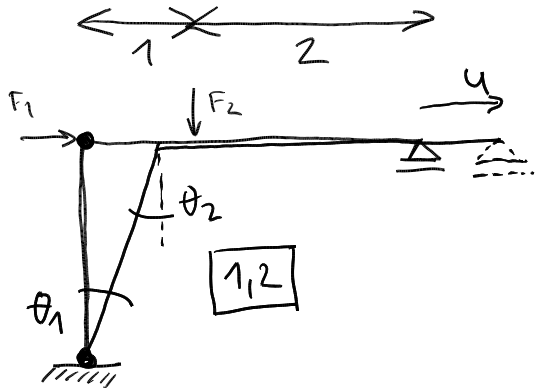
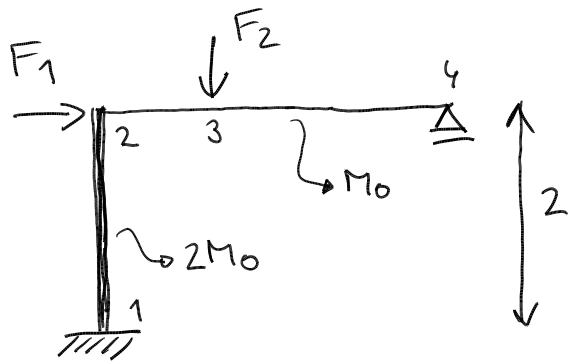
$$F_2 \dot{w}_3 \mu = \frac{5}{2} M_0 \dot{w}_3$$

$$\rightarrow \mu = \frac{5M_0}{2F_2} = \mu_{23}$$



$$F_{ext} = \mu [F_1 \dot{u} + F_2 \dot{w}_3]$$

$$D_{int} = \dot{\theta}_1 2M_0 + \dot{\theta}_3 M_0$$



$$F_{ext} = F_1 \cdot \dot{u} \cdot \mu$$

$$D_{int} = 2M_0 \dot{\theta}_1 + M_0 \dot{\theta}_2$$

$\hookrightarrow \frac{\dot{u}}{2} \quad \hookrightarrow \frac{\dot{u}}{2}$

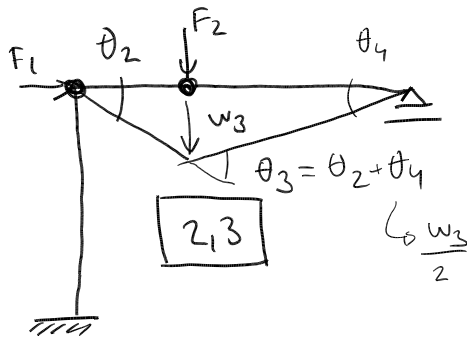
$$F_{ext} = D_{int}$$

$$F_1 \frac{\dot{u}}{2} \mu = \frac{3M_0 \dot{u}}{2}$$

$$\rightarrow \mu = \frac{3M_0}{2F_1} = \mu_{12}$$

→ Analyza vseh kinematičnyh prapustljivih mehanizmov

— konstrukcija 1x SN → 2 plast. klaby } 3 možni mehanizmi  
 — 3 kritični prerezi } 1,2; 1,3; 2,3



$$F_{ext} = F_2 \dot{w}_3 \cdot \mu$$

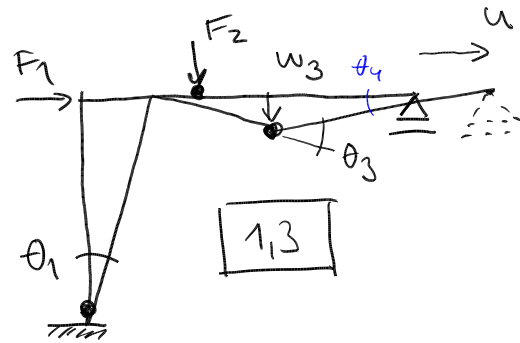
$$D_{int} = \dot{\theta}_2 M_0 + \dot{\theta}_3 M_0 = \frac{5}{2} M_0 \dot{w}_3$$

$\hookrightarrow \frac{\dot{w}_3}{1} \quad \hookrightarrow \frac{\dot{w}_3}{2} + \frac{\dot{w}_3}{1}$

$$F_{ext} = D_{int}$$

$$F_2 \dot{w}_3 \mu = \frac{5}{2} M_0 \dot{w}_3$$

$$\rightarrow \mu = \frac{5M_0}{2F_2} = \mu_{23}$$



$$F_{ext} = \mu [F_1 \dot{u} + F_2 \dot{w}_3]$$

$$D_{int} = \dot{\theta}_1 2M_0 + \dot{\theta}_3 M_0$$

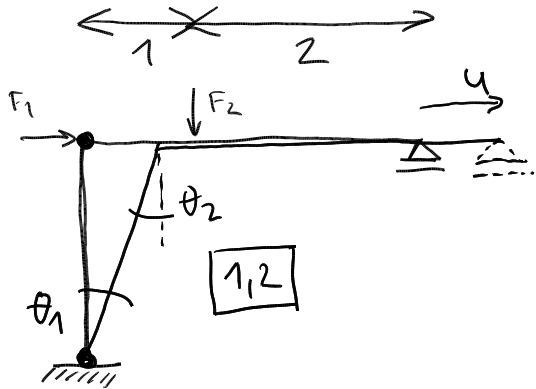
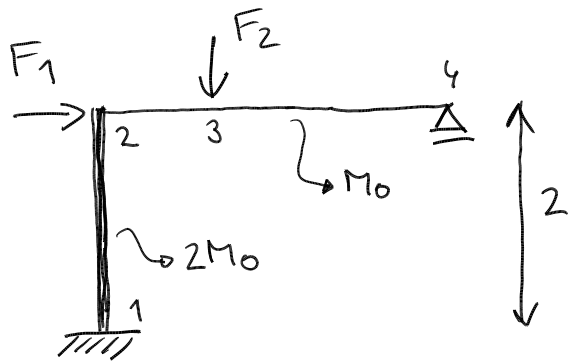
$$\hookrightarrow \frac{\dot{u}}{2}$$

$$\dot{w}_3 = \dot{\theta}_1 \cdot 1 = \frac{\dot{u}}{2}$$

$$\dot{\theta}_4 = \frac{\dot{w}_3}{2} = \frac{\dot{u}}{4}$$

$$\dot{\theta}_3 = \dot{\theta}_2 + \dot{\theta}_4 = \dot{u} \left( \frac{1}{2} + \frac{1}{4} \right)$$

$$\hookrightarrow \dot{\theta}_2 = \dot{\theta}_1$$



$$F_{ext} = F_1 \cdot \dot{u} \cdot \mu$$

$$D_{int} = 2M_0 \dot{\theta}_1 + M_0 \dot{\theta}_2$$

$\hookrightarrow \frac{\dot{u}}{2}$        $\hookrightarrow \frac{\dot{u}}{2}$

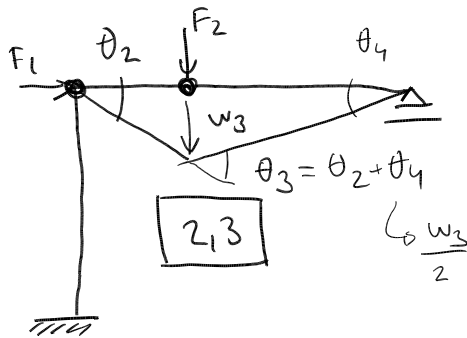
$$F_{ext} = D_{int}$$

$$F_1 \frac{\dot{u}}{2} \mu = \frac{3M_0 \dot{u}}{2}$$

$$\rightarrow \mu = \frac{3M_0}{2F_1} = \mu_{12}$$

→ Analýza všech kinematiky přípustných mechanismů

— konstrukce 1x SN → 2 plast. klaby } 3 možné mechanismy  
 — 3 kritické průřezy                    1,2; 1,3; 2,3



$$F_{ext} = F_2 \dot{w}_3 \cdot \mu$$

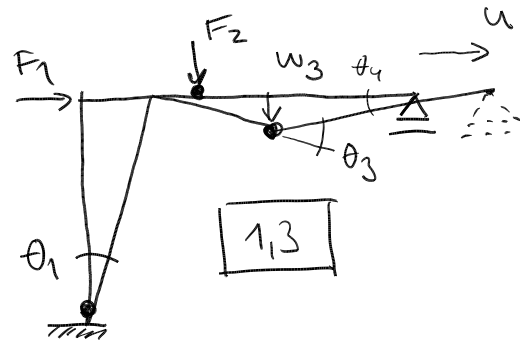
$$D_{int} = \dot{\theta}_2 M_0 + \dot{\theta}_3 M_0 = \frac{5}{2} M_0 \dot{w}_3$$

$\hookrightarrow \frac{\dot{w}_3}{1}$        $\hookrightarrow \frac{\dot{w}_3}{2} + \frac{\dot{w}_3}{1}$

$$F_{ext} = D_{int}$$

$$F_2 \dot{w}_3 \mu = \frac{5}{2} M_0 \dot{w}_3$$

$$\rightarrow \mu = \frac{5M_0}{2F_2} = \mu_{23}$$



$$F_{ext} = \mu [F_1 \dot{u} + F_2 \dot{w}_3]$$

$$D_{int} = \dot{\theta}_1 2M_0 + \dot{\theta}_3 M_0$$

$\hookrightarrow \frac{\dot{u}}{2}$        $\dot{w}_3 = \dot{\theta}_1 \cdot 1 = \frac{\dot{u}}{2}$

$$\dot{\theta}_4 = \frac{\dot{w}_3}{2} = \frac{\dot{u}}{4} \quad \dot{\theta}_3 = \dot{\theta}_1 + \dot{\theta}_4 = \dot{u} \left( \frac{1}{2} + \frac{1}{4} \right)$$

$\hookrightarrow \dot{\theta}_2 = \dot{\theta}_1$

$$F_{ext} = \mu [F_1 \dot{u} + F_2 \cdot \frac{\dot{u}}{2}]$$

$$D_{int} = \frac{\dot{u}}{2} \cdot 2M_0 + \frac{3}{4} \dot{u} M_0 = \frac{7}{4} \dot{u} M_0$$

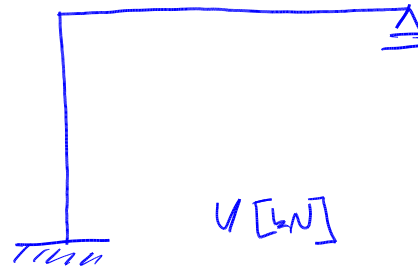
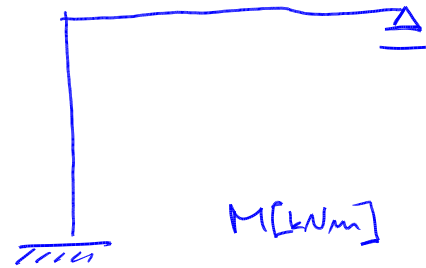
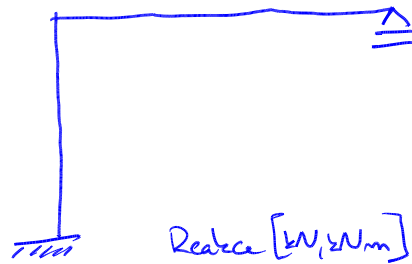
$$\rightarrow \mu = \frac{\frac{7}{4} M_0}{F_1 + 0.5 F_2} = \mu_{13}$$

$$F_1 = 10 \text{ kN}, F_2 = 20 \text{ kN}, M_0 = 100 \text{ kNm}$$

$$F_1 = 10 \text{ kN}, F_2 = 20 \text{ kN}, M_0 = 100 \text{ kNm}$$

$$\rightarrow M_{12} = \frac{3 \cdot 100}{2 \cdot 10} = 15 \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 20} = 12,5 \quad M_{13} = \frac{\frac{7}{4} \cdot 100}{10 + 0,5 \cdot 20} = \underline{\underline{8,75}}$$

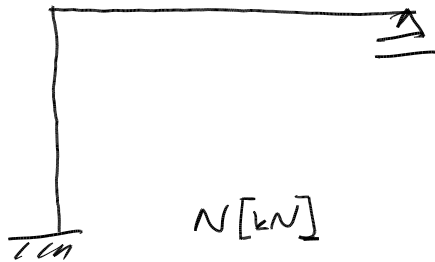
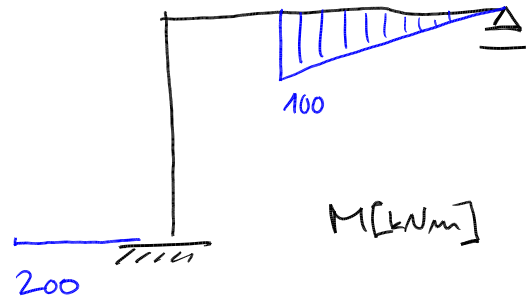
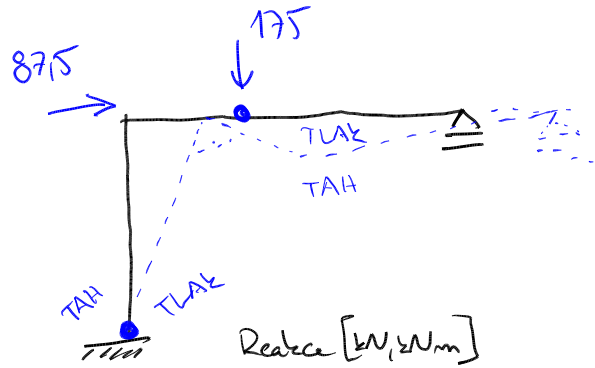
Vykreslení:



$$F_1 = 10 \text{ kN}, F_2 = 20 \text{ kN}, M_0 = 100 \text{ kNm}$$

$$\rightarrow M_{12} = \frac{3 \cdot 100}{2 \cdot 10} = 15 \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 20} = 12,5 \quad M_{13} = \frac{\frac{7}{4} \cdot 100}{10 + 0,5 \cdot 20} = \underline{\underline{8,75}}$$

Yükreseni:

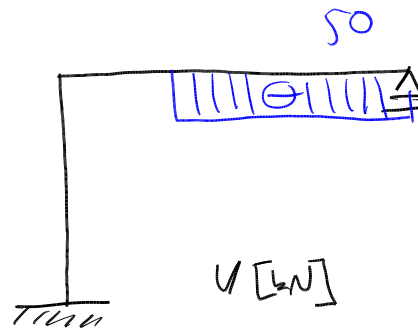
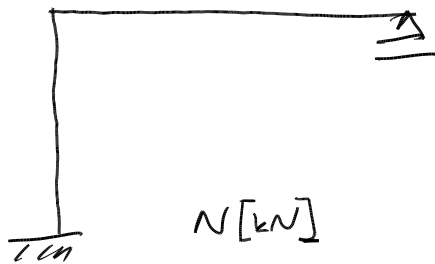
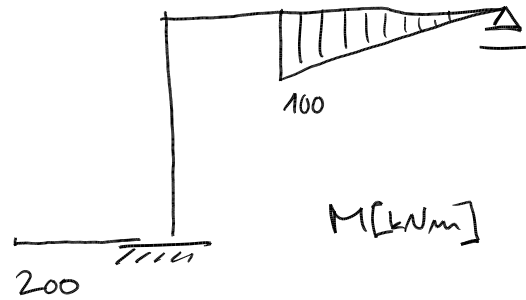
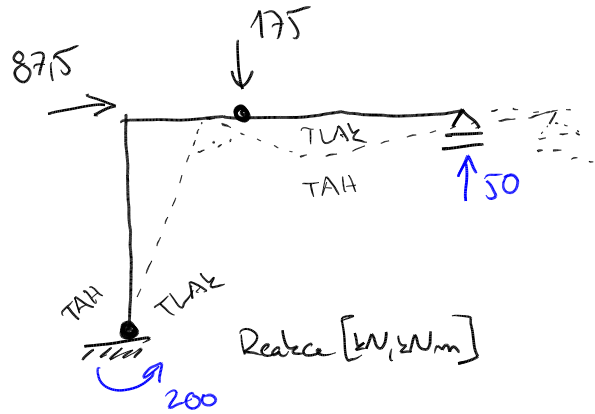




$$F_1 = 10 \text{ kN}, F_2 = 20 \text{ kN}, M_0 = 100 \text{ kNm}$$

$$\rightarrow M_{12} = \frac{3 \cdot 100}{2 \cdot 10} = 15 \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 20} = 12,5 \quad M_{13} = \frac{\frac{7}{4} \cdot 100}{10 + 0,5 \cdot 20} = \underline{\underline{8,75}}$$

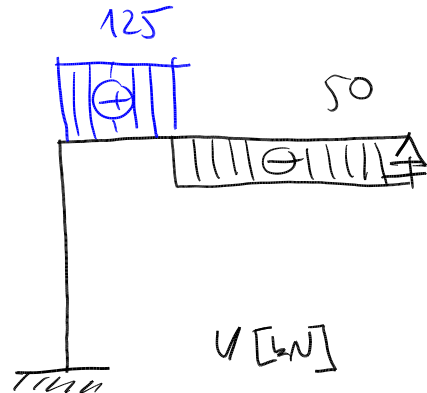
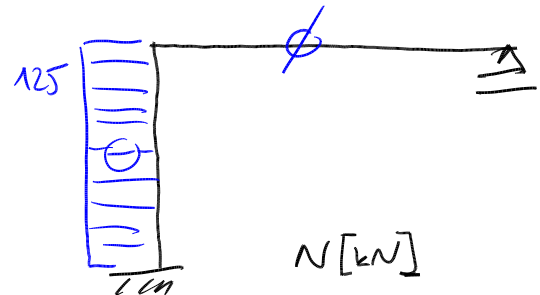
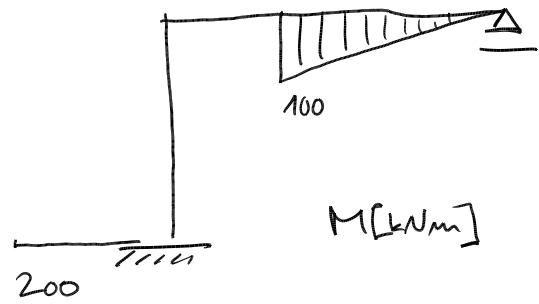
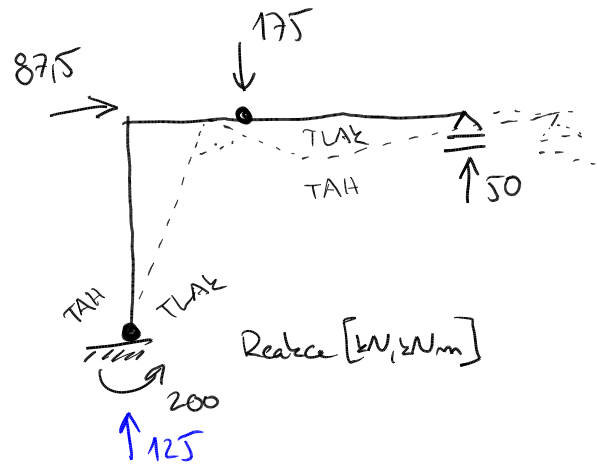
Uy kresleni:



$$F_1 = 10 \text{ kN}, F_2 = 20 \text{ kN}, M_0 = 100 \text{ kNm}$$

$$\rightarrow M_{12} = \frac{3 \cdot 100}{2 \cdot 10} = 15 \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 20} = 12,5 \quad M_{13} = \frac{\frac{7}{4} \cdot 100}{10 + 0,5 \cdot 20} = \underline{\underline{8,75}}$$

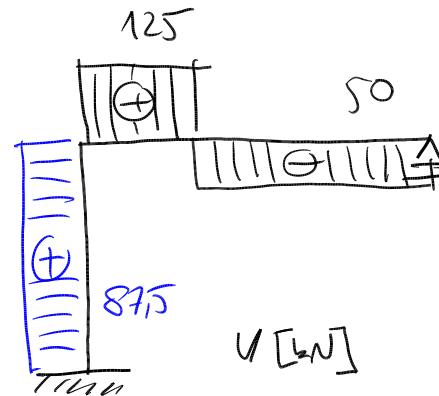
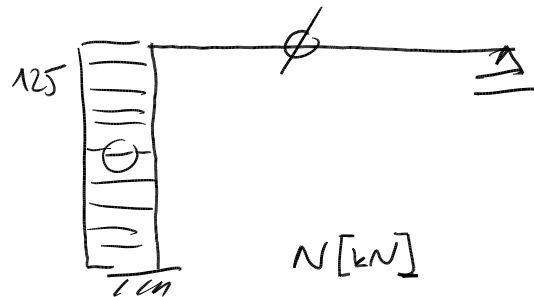
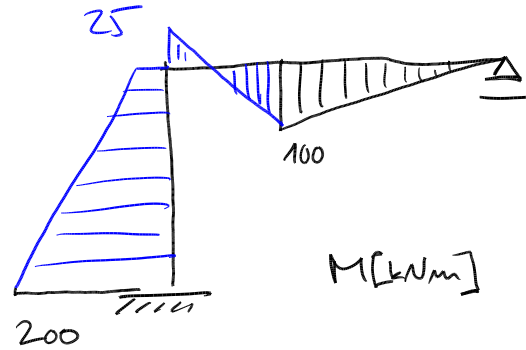
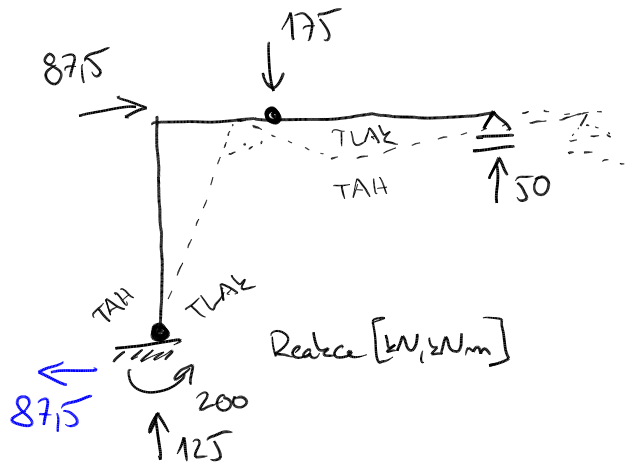
Uy kresleni:



$$F_1 = 10 \text{ kN}, F_2 = 20 \text{ kN}, M_0 = 100 \text{ kNm}$$

$$\rightarrow M_{12} = \frac{3 \cdot 100}{2 \cdot 10} = 15 \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 20} = 12,5 \quad M_{13} = \frac{\frac{7}{4} \cdot 100}{10 + 0,5 \cdot 20} = \underline{\underline{8,75}}$$

Uy kresleni:

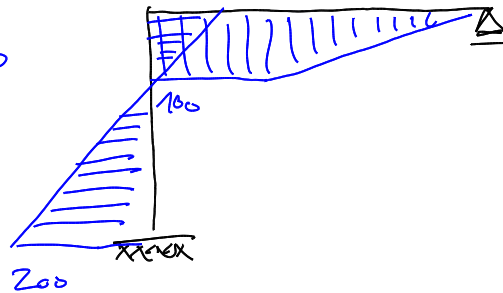
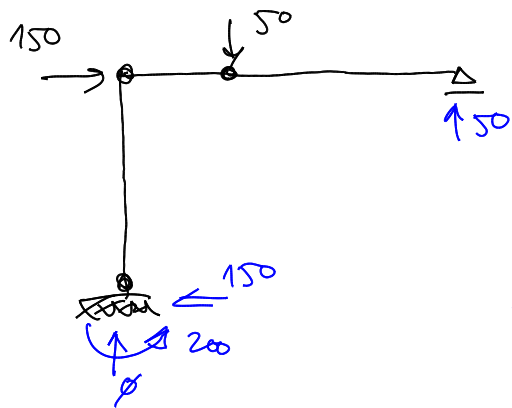


$$F_1 = 20 \text{ kN}, F_2 = 10 \text{ kN}, M_0 = 100 \text{ kNm}$$

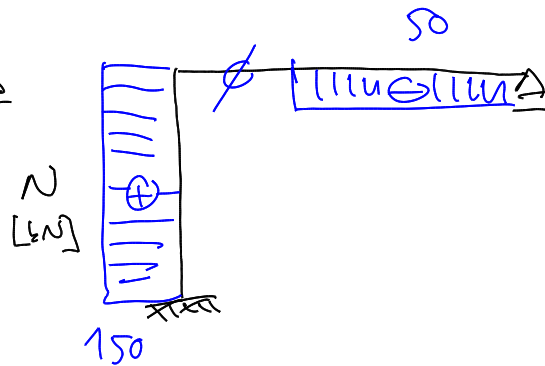
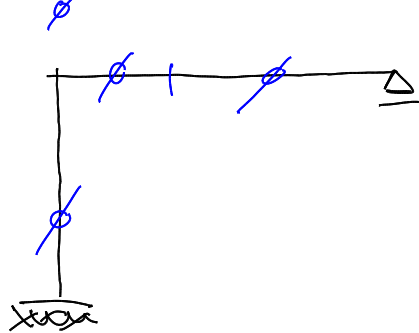
$$M_{12} = \frac{3 \cdot 100}{2 \cdot 20} = 7.5 \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 10} = 25 \quad M_{13} = \frac{\frac{7}{9} \cdot 100}{20 + 5} = \underline{\underline{7}}$$

$$F_1 = 30 \text{ kN}, F_2 = 10 \text{ kN}, M_0 = 100 \text{ kNm}$$

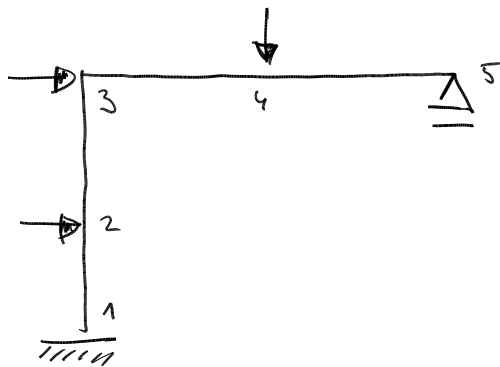
$$M_{12} = \frac{3 \cdot 100}{2 \cdot 30} = \underline{\underline{5}} \quad M_{23} = \frac{5 \cdot 100}{2 \cdot 10} = 25 \quad M_{13} = \frac{\frac{7}{9} \cdot 100}{30 + 5} = \underline{\underline{5}}$$



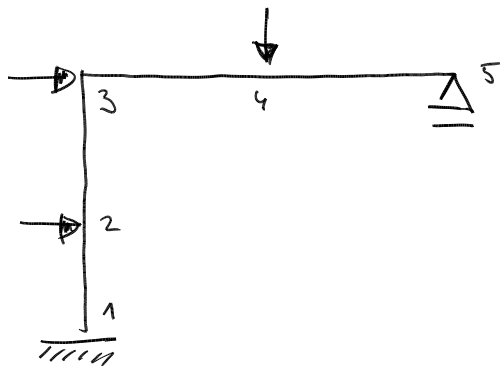
M  
[kNm]



N  
[kN]



- určit počet možných mechanismů plastického kolapsu
- mechanismy schématicky označit



→ určit počet možných mechanizmů plastického kolapsu

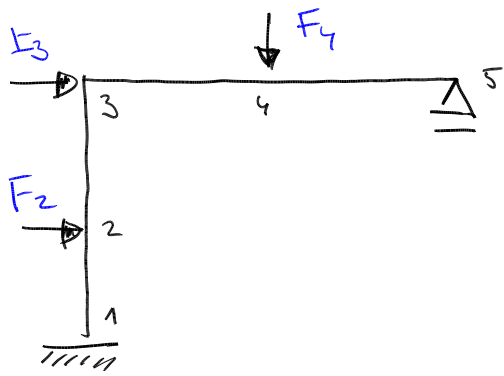
→ mechanismy schématicky označit

počet krit. průřezů = 4

stat. neurčitost = 1

$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

- 1,2    2,3    3,4
- 1,3    2,4
- 1,4



→ určit počet možných mechanismů plastického kolapsu

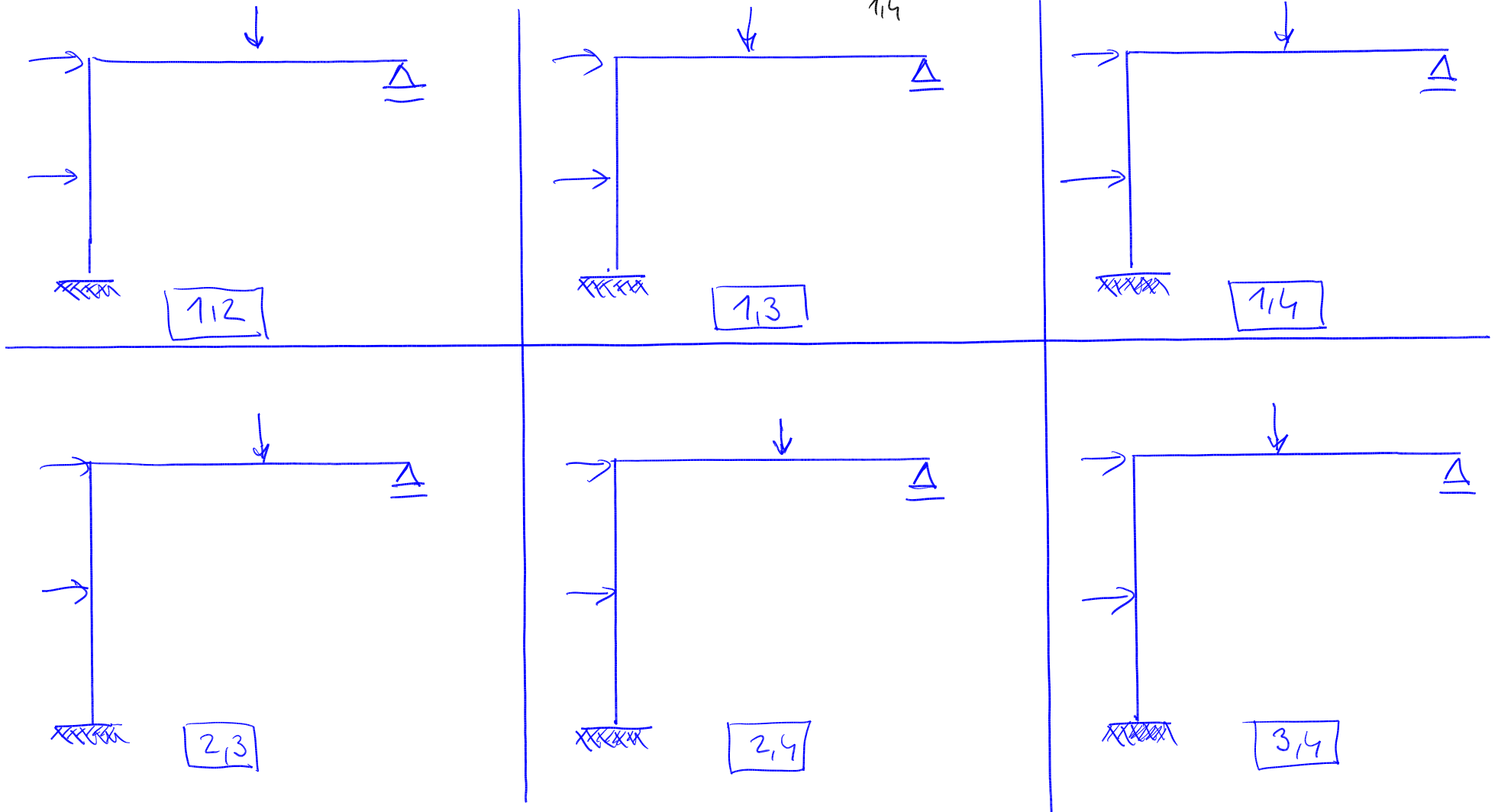
→ mechanismy schématicky označit

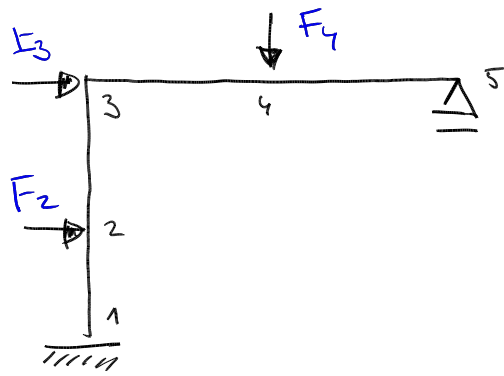
počet krit. průřezů = 4

stat. neurčitost = 1

→ počet kombinací =  $\binom{4}{1+1} = \frac{4!}{2!2!} = 6$

- 1,2    2,3    3,4
- 1,3    2,4
- 1,4





→ určit počet možných mechanizmů plastického kolapsu

→ mechanizmy schématicky označit

počet krit. průřezů = 4

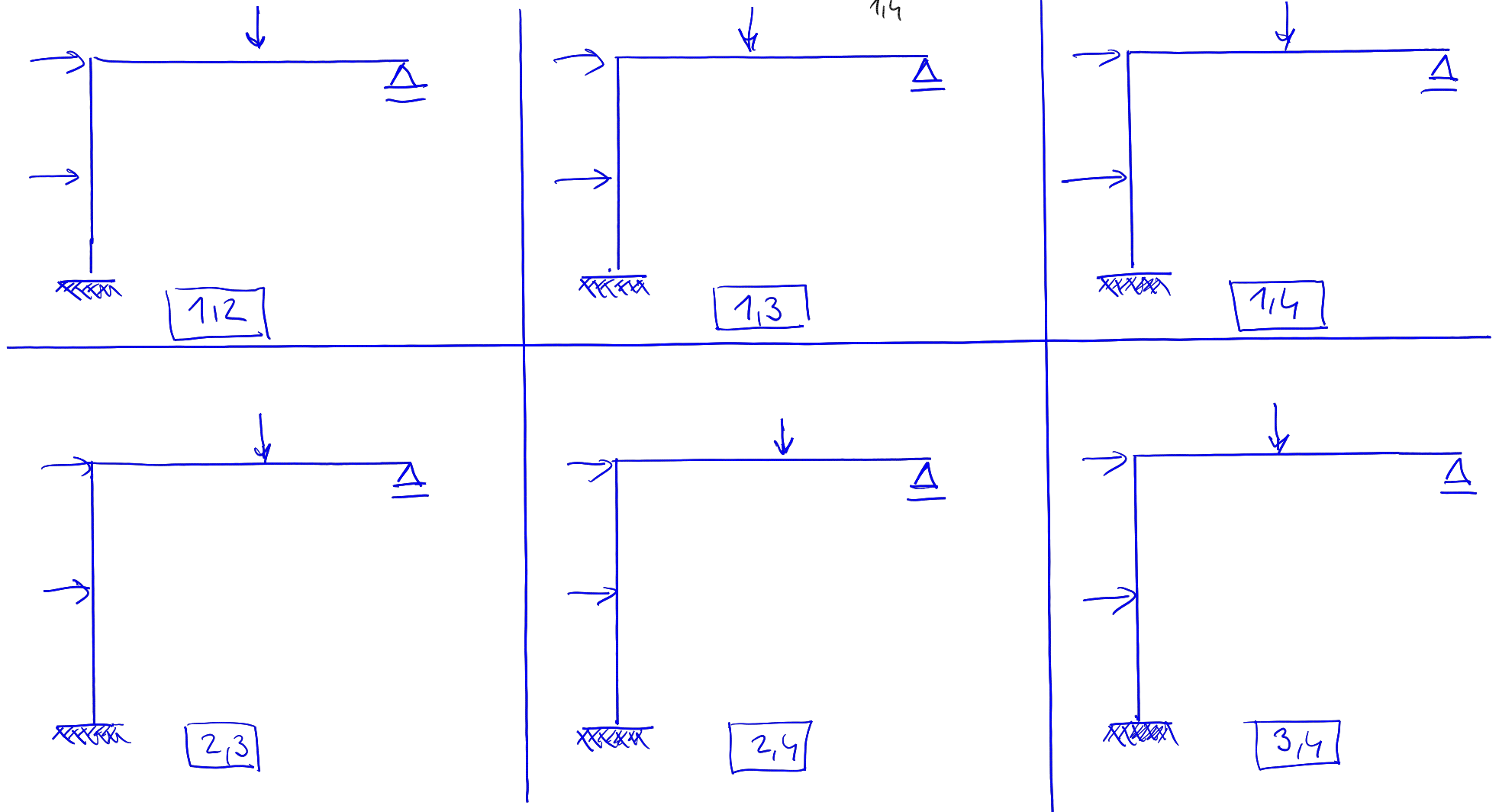
stat. neurčitost = 1

$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

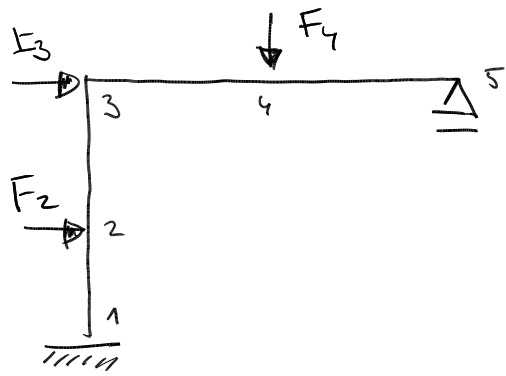
1,2 2,3 3,4

1,3 2,4

1,4







→ určit počet možných mechanismů plastického kolapsu

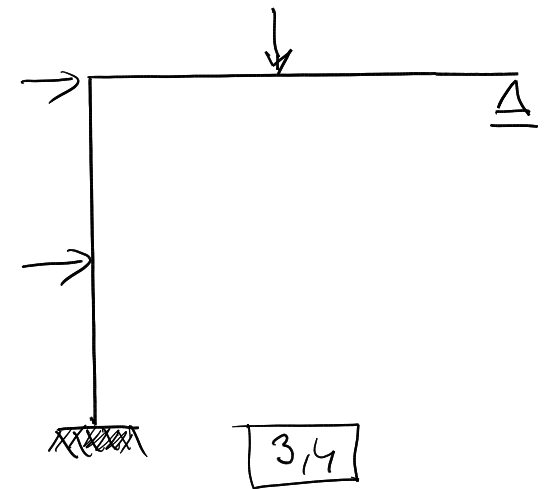
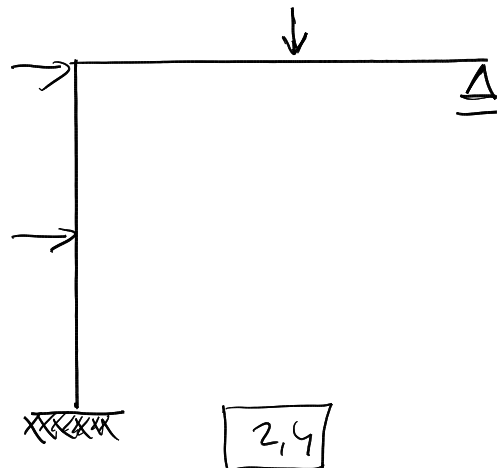
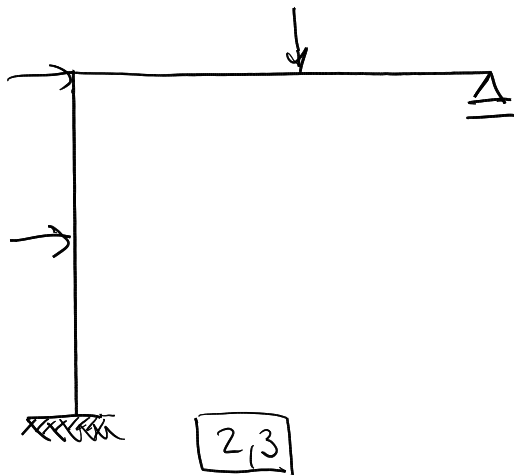
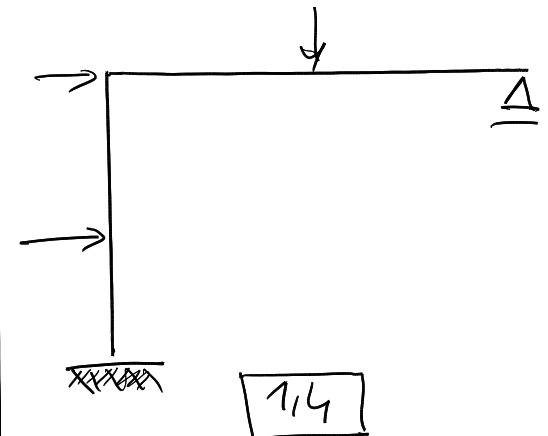
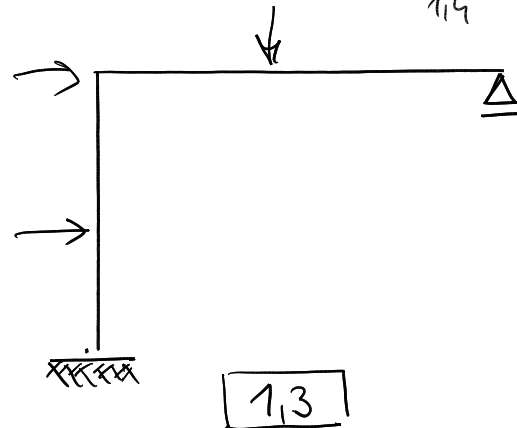
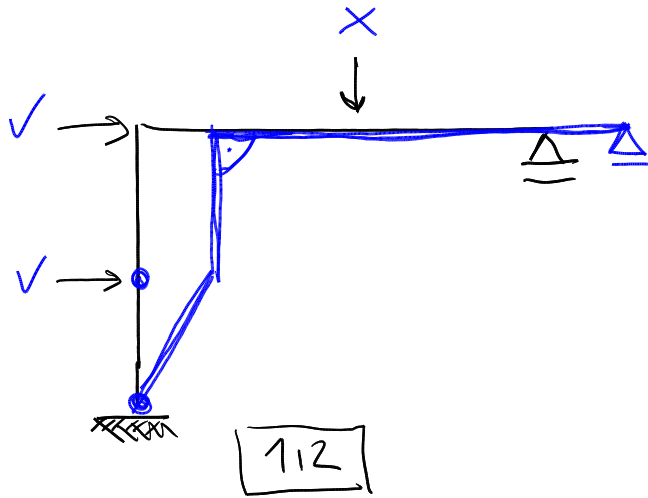
→ mechanismy schématicky označit

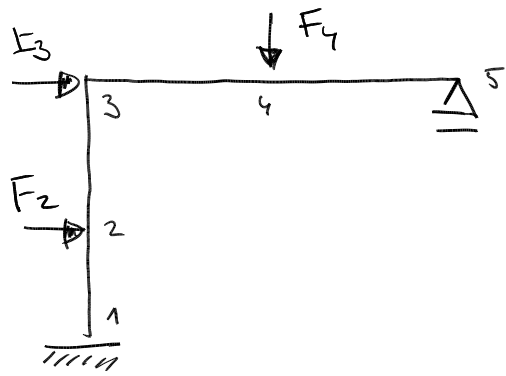
počet krit. průřezů = 4

stat. neurčitost = 1

$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

- 1,2    2,3    3,4
- 1,3    2,4
- 1,4





→ určit počet možných mechanismů plastického kolapsu

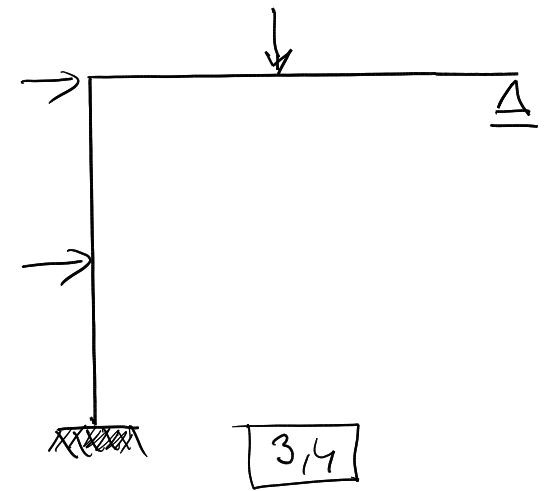
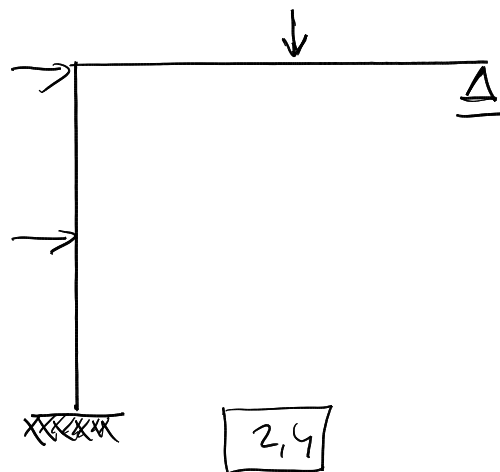
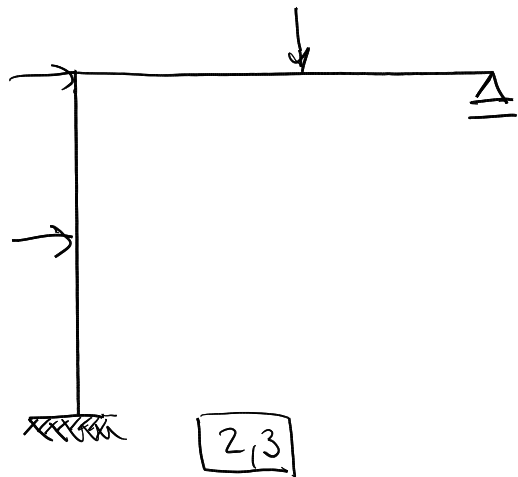
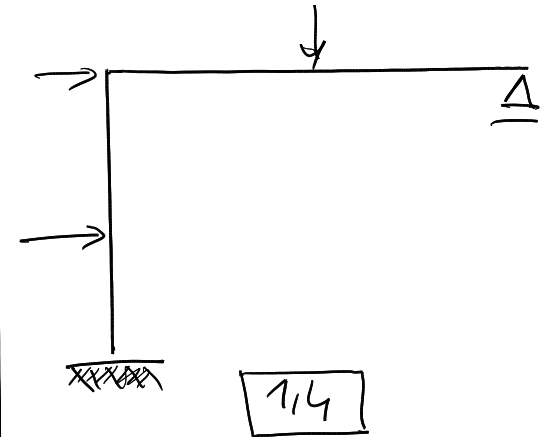
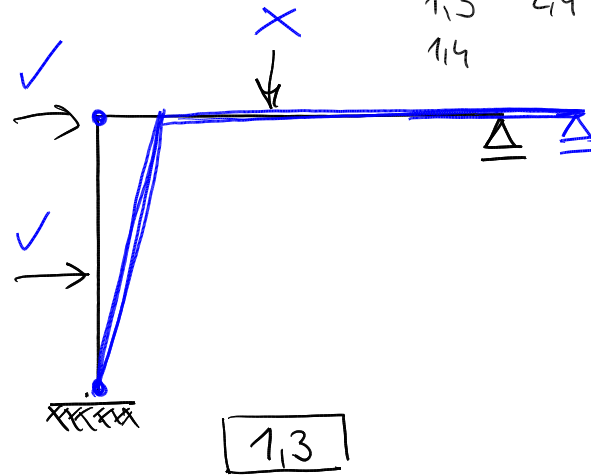
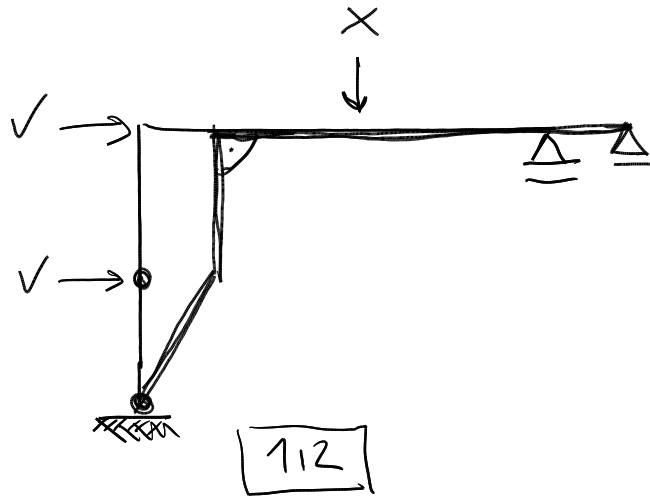
→ mechanismy schématicky označit

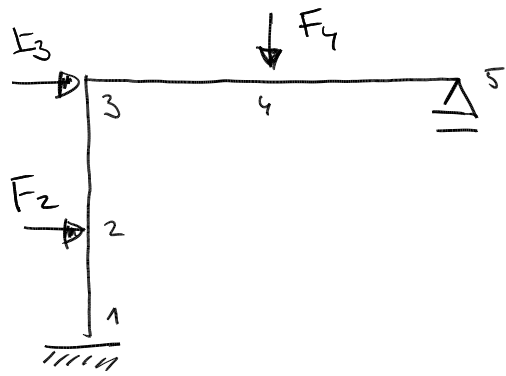
počet krit. průřezů = 4

stat. neurčitost = 1

$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

1,2   2,3   3,4  
1,3   2,4  
1,4





→ určit počet možných mechanismů plastického kolapsu

→ mechanismy schématicky označit

počet krit. průřezů = 4

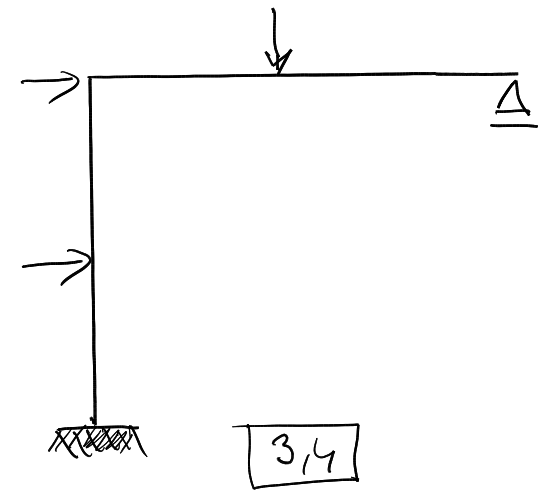
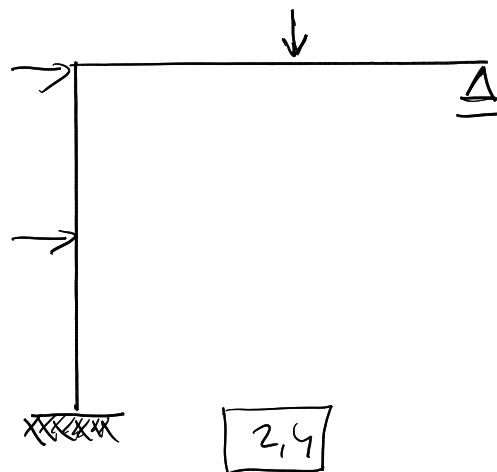
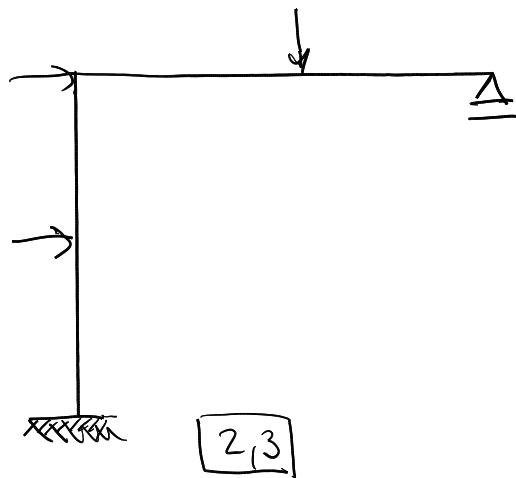
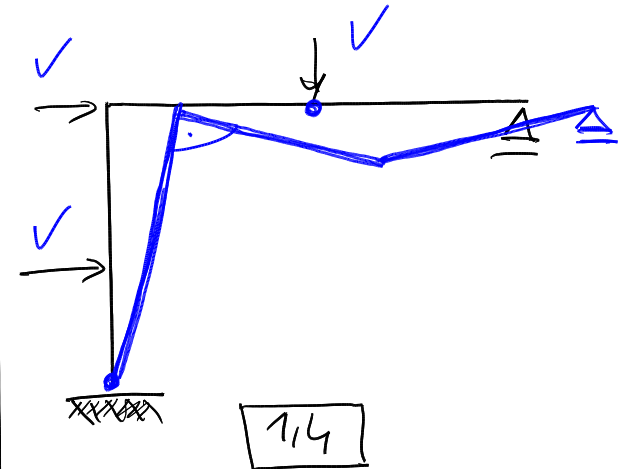
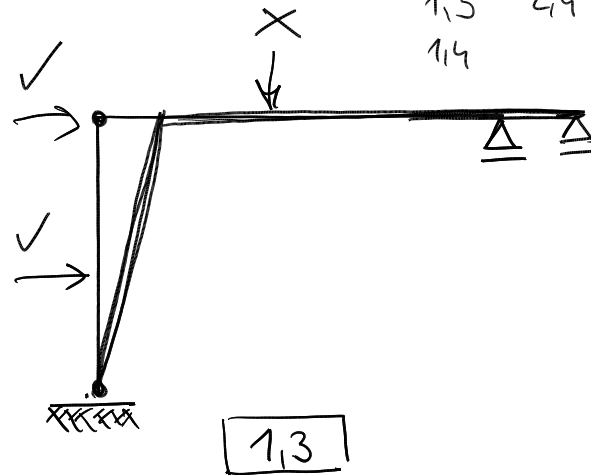
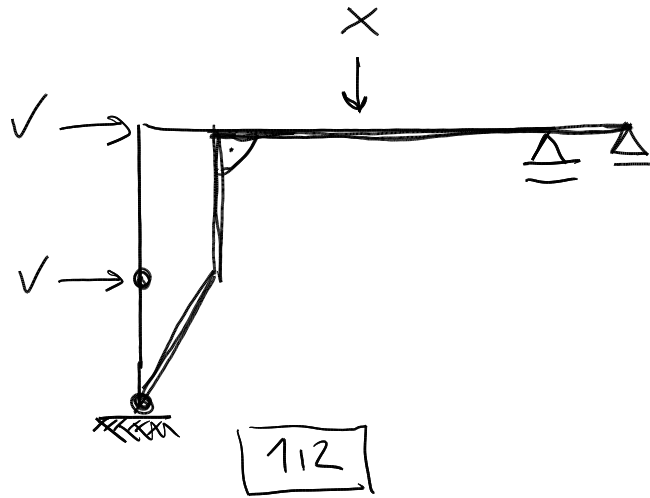
stat. neurčitost = 1

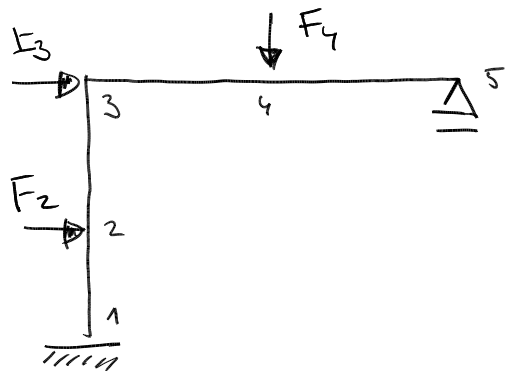
→ počet kombinací =  $\binom{4}{1+1} = \frac{4!}{2!2!} = 6$

1,2 2,3 3,4

1,3 2,4

1,4





→ určit počet možných mechanismů plastického kolapsu

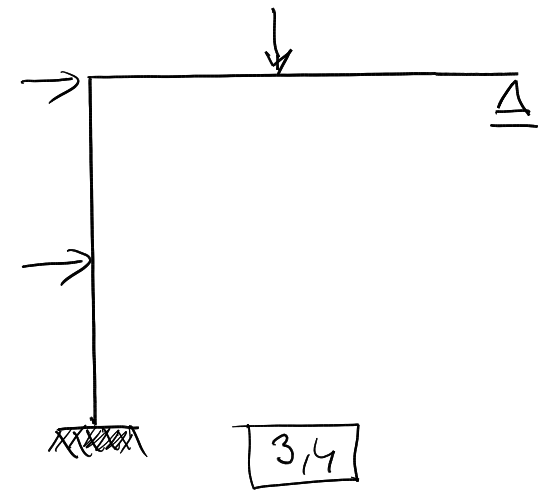
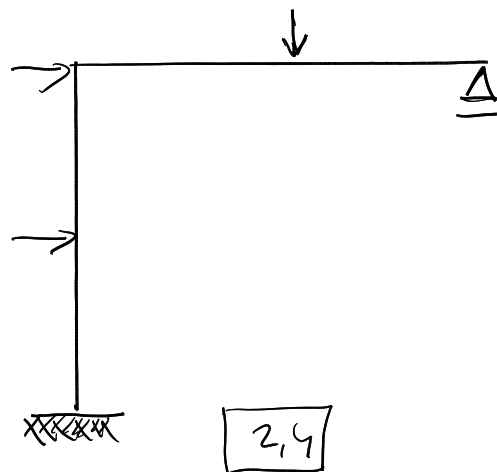
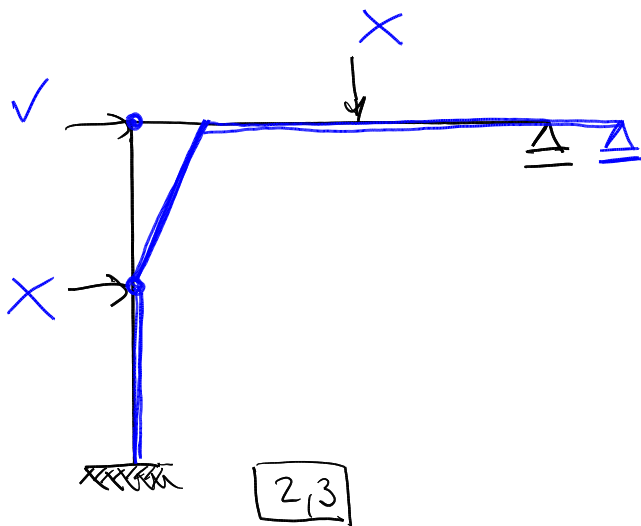
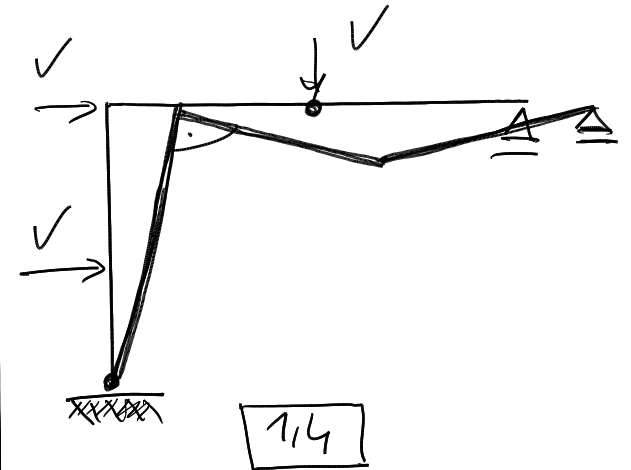
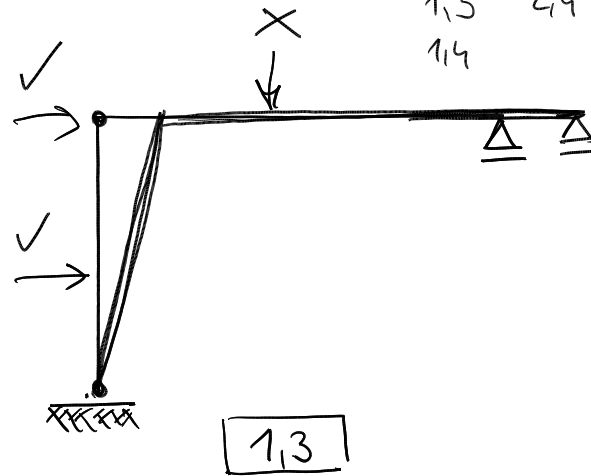
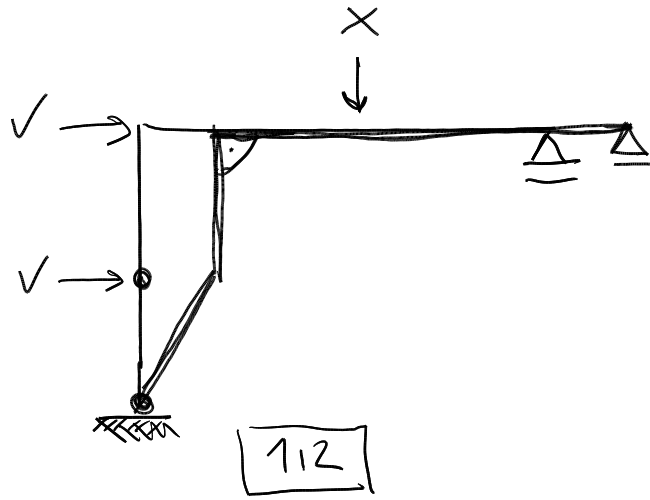
→ mechanismy schématicky označit

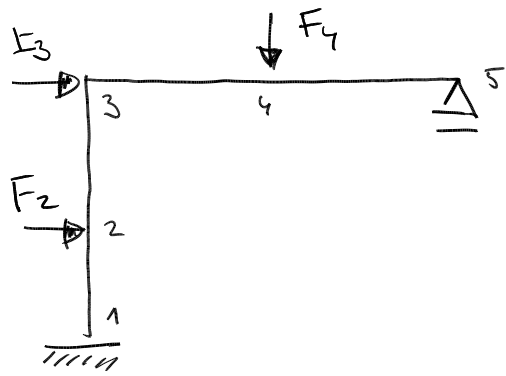
počet krit. průřezů = 4

stat. neurčitost = 1

$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

1,2   2,3   3,4  
1,3   2,4  
1,4





→ určit počet možných mechanizmů plastického kolapsu

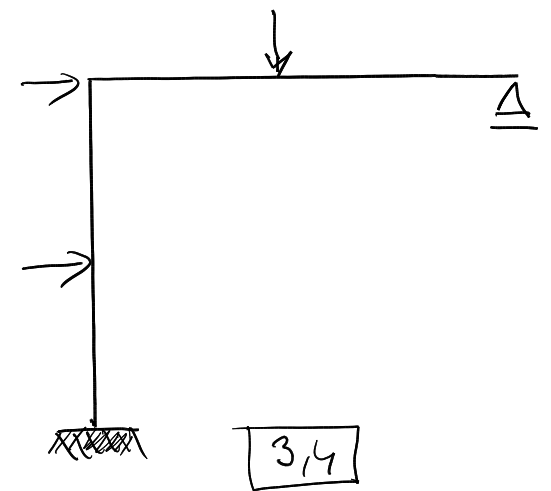
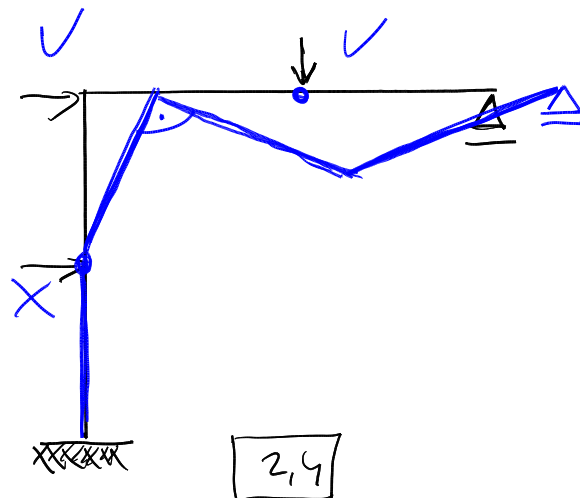
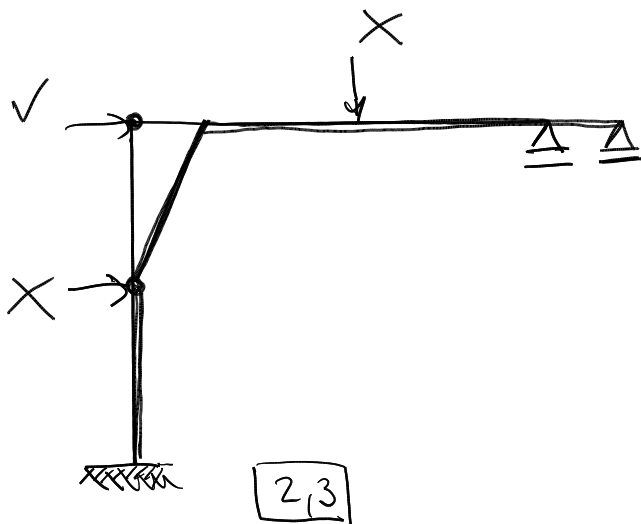
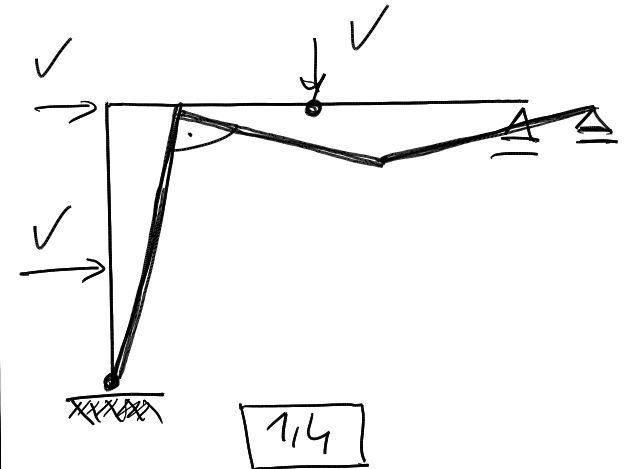
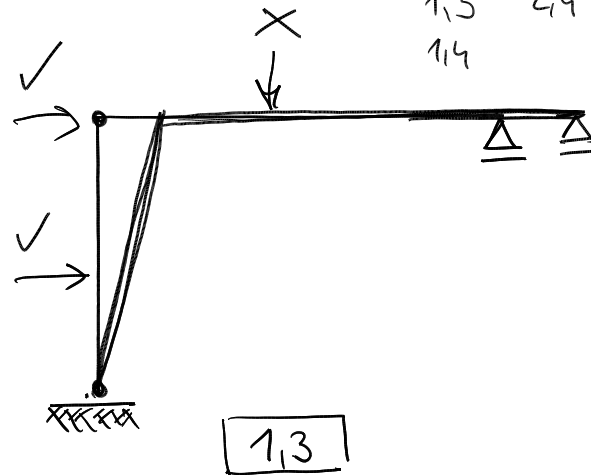
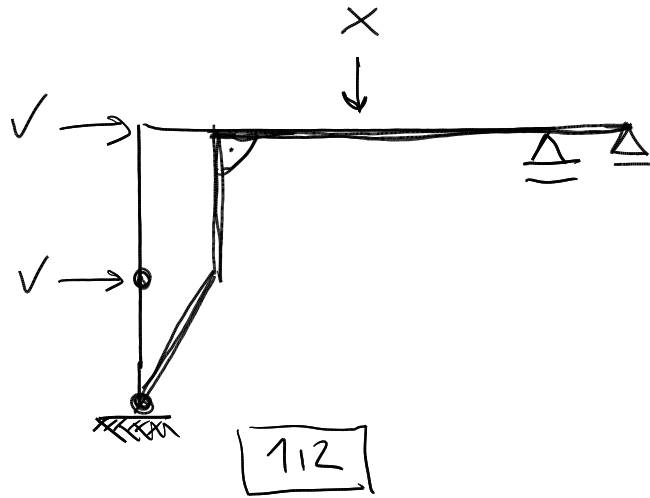
→ mechanizmy schématicky označit

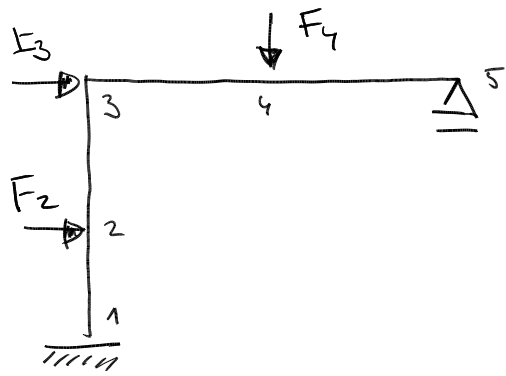
počet krit. průřezů = 4

stat. neurčitost = 1

$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

1,2    2,3    3,4  
1,3    2,4  
1,4





→ určit počet možných mechanismů plastického kolapsu

→ mechanismy schématicky označit

počet krit. průřezů = 4

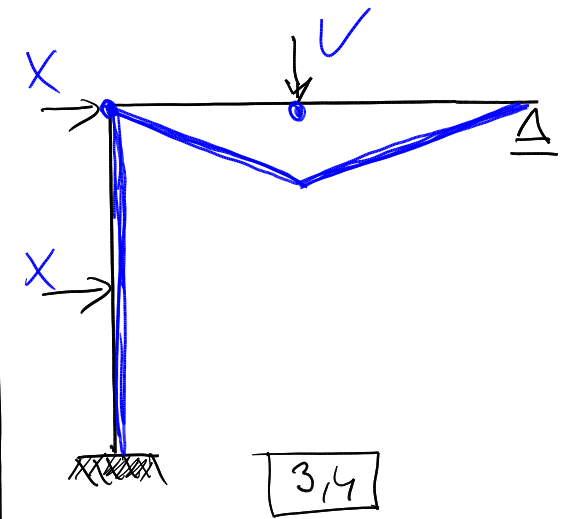
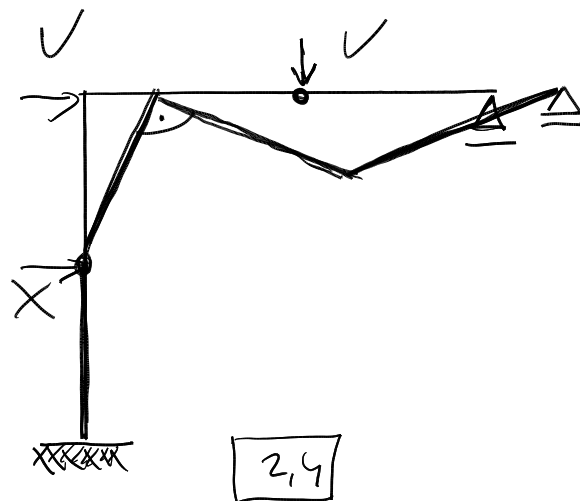
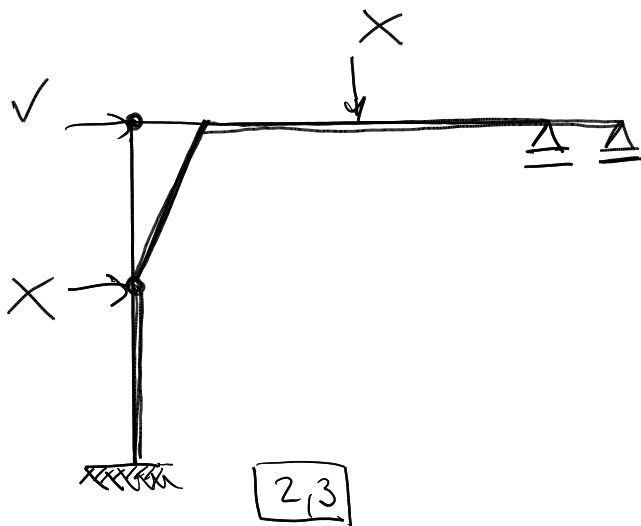
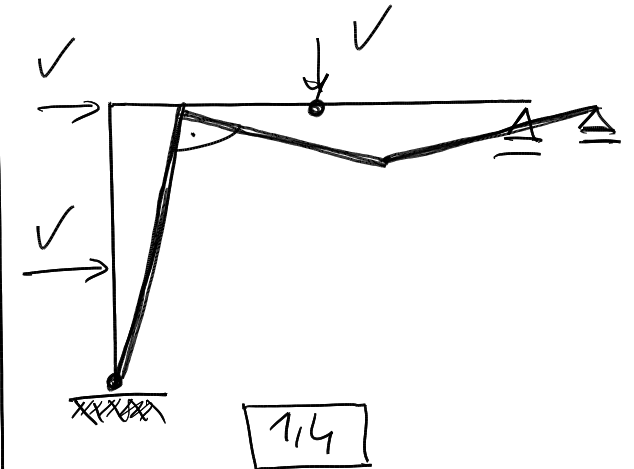
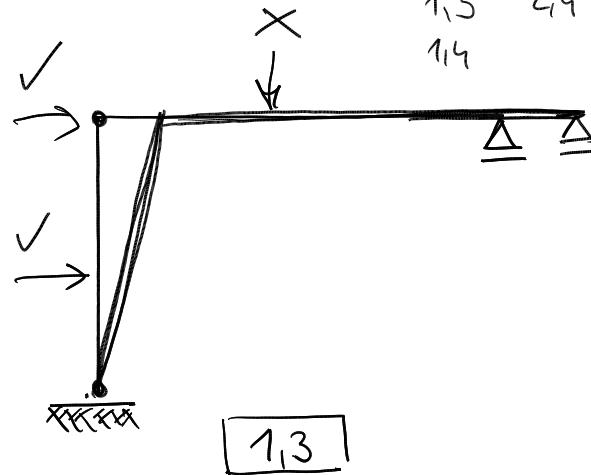
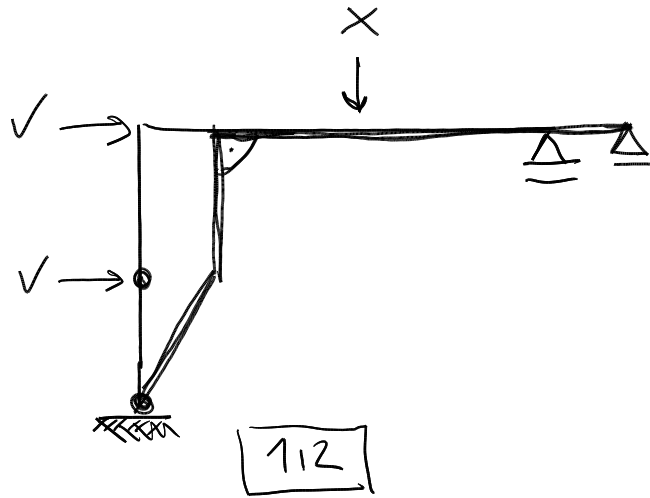
stat. neurčitost = 1

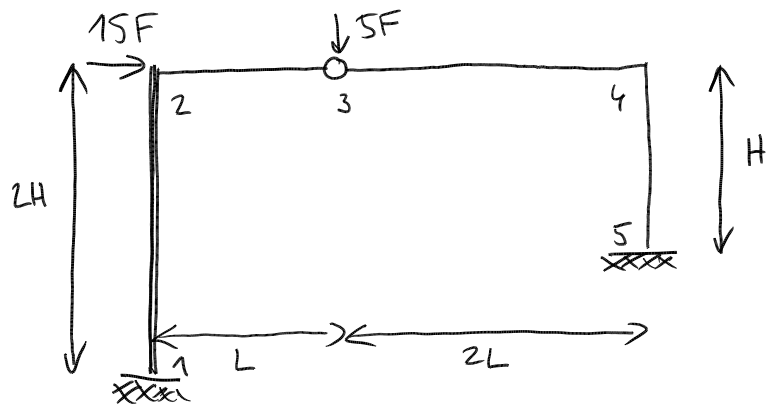
$$\rightarrow \text{počet kombinací} = \binom{4}{1+1} = \frac{4!}{2!2!} = 6$$

1,2 2,3 3,4

1,3 2,4

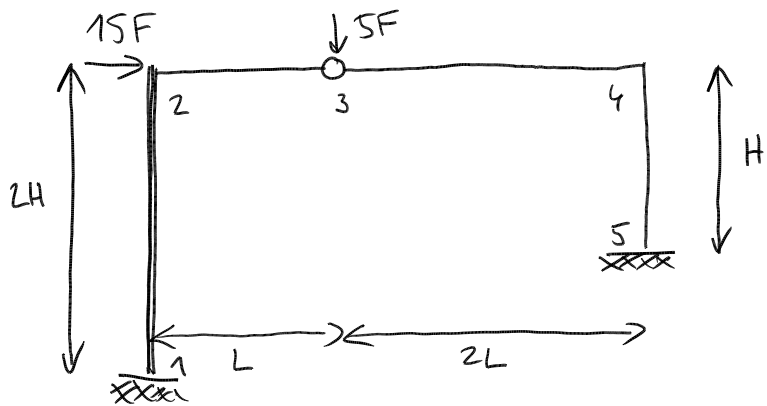
1,4





$L = H = 4\text{m}$   
 $M_0 = 150\text{kNm}$   
 $M_0^2 = 200\text{kNm}$

- analiza všech kinematických příp. mechanismů
- $F$  v mezním plast. stavu
- $M, U, N$  + reakce



$$L = H = 4\text{m}$$

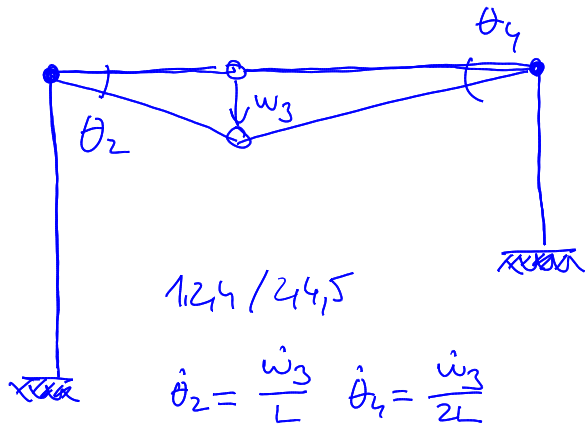
$$M_0 = 150\text{kNm}$$

$$M_0^2 = 200\text{kNm}$$

→ analiza všech kinematických příp. mechanismů

→ F v mezním plast. stavu

→  $M, U, N$  + reakce



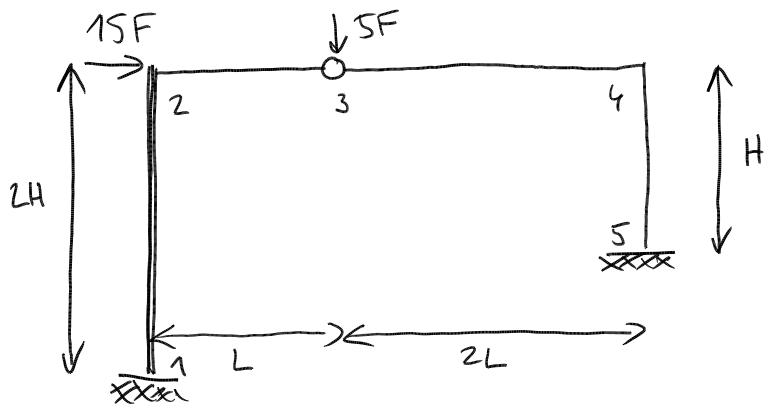
$$F_{ext} = 5F \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$5F \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



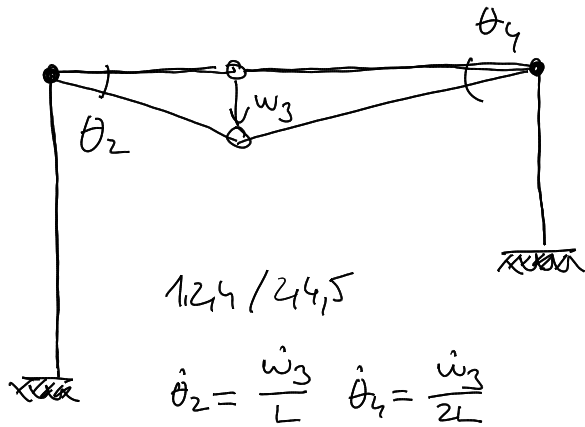


$$L = H = 4\text{m}$$

$$M_0 = 150\text{kNm}$$

$$M_0^2 = 200\text{kNm}$$

- analiza všech kinematických příp. mechanismů
- F v mezním plast. stavu
- $M, U, N$  + reakce



$$1,25 / 2,5$$

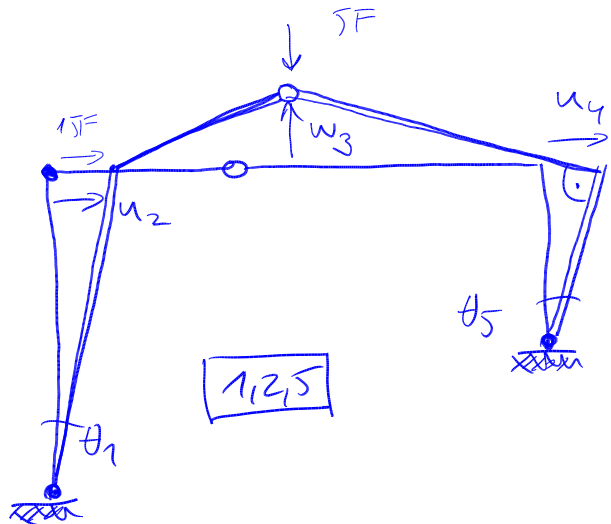
$$\dot{\theta}_2 = \frac{\dot{w}_3}{L} \quad \dot{\theta}_4 = \frac{\dot{w}_3}{2L}$$

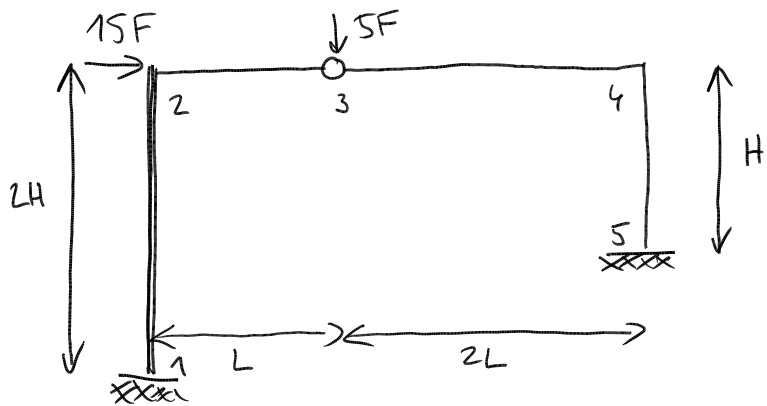
$$F_{ext} = SF \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$SF \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



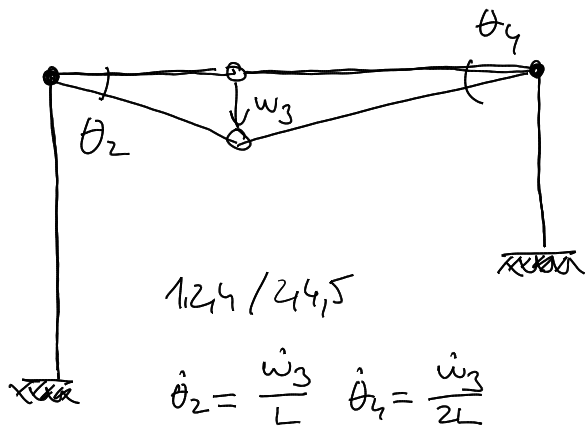


$$L = H = 4\text{m}$$

$$M_0 = 150\text{kNm}$$

$$M_0^2 = 200\text{kNm}$$

- analiza všech kinematických příp. mechanismů
- F v mezním plast. stavu
- $M, U, N$  + reakce



$$1,24 / 24,5$$

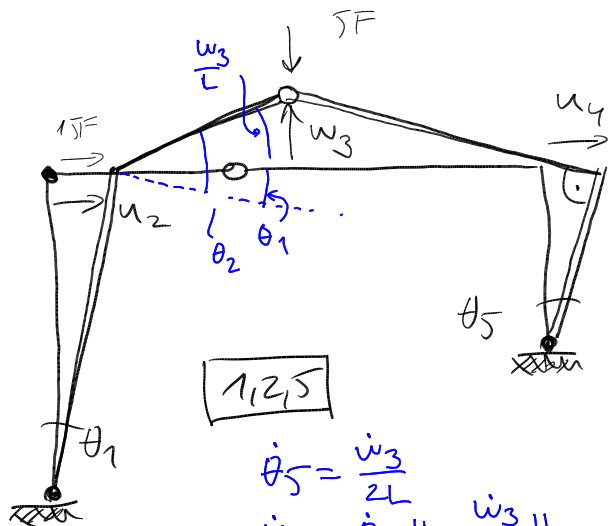
$$\dot{\theta}_2 = \frac{\dot{w}_3}{L} \quad \dot{\theta}_4 = \frac{\dot{w}_3}{2L}$$

$$F_{ext} = SF \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$SF \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



$$1,25$$

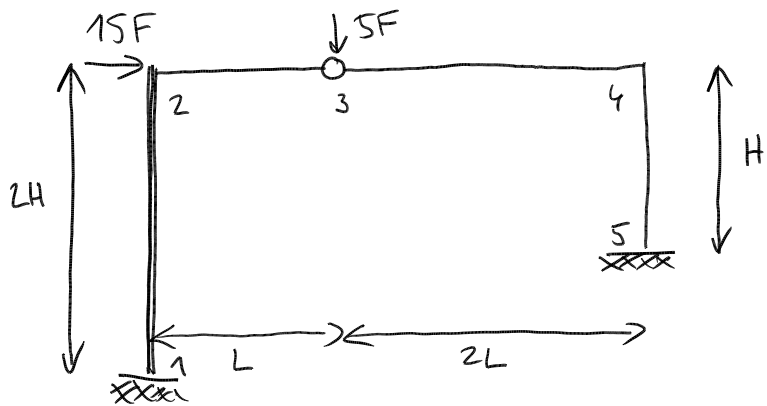
$$\dot{\theta}_5 = \frac{\dot{w}_3}{2L}$$

$$\dot{u}_4 = \dot{\theta}_5 \cdot H = \frac{\dot{w}_3}{2L} H$$

$$\dot{u}_2 = \dot{u}_4$$

$$\dot{\theta}_1 = \frac{\dot{u}_4}{2H} = \frac{\dot{w}_3}{4L}$$

$$\dot{\theta}_2 = \frac{\dot{w}_3}{4L} + \frac{\dot{w}_3}{L}$$

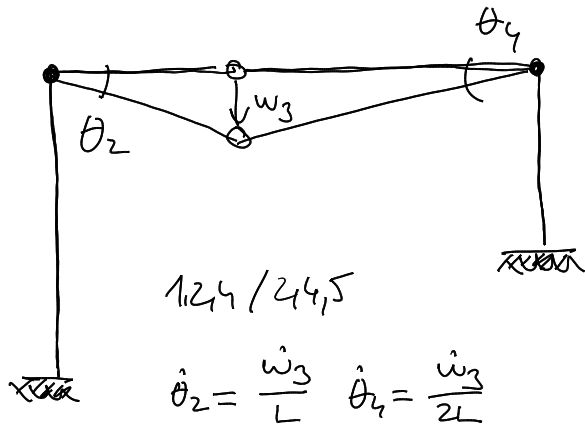


$$L = H = 4 \text{ m}$$

$$M_0 = 150 \text{ kNm}$$

$$M_0^2 = 200 \text{ kNm}$$

- analiza všech kinematických příp. mechanismů
- F v mezním plast. stavu
- $M, U, N$  + reakce



$$1,25 / 4,5$$

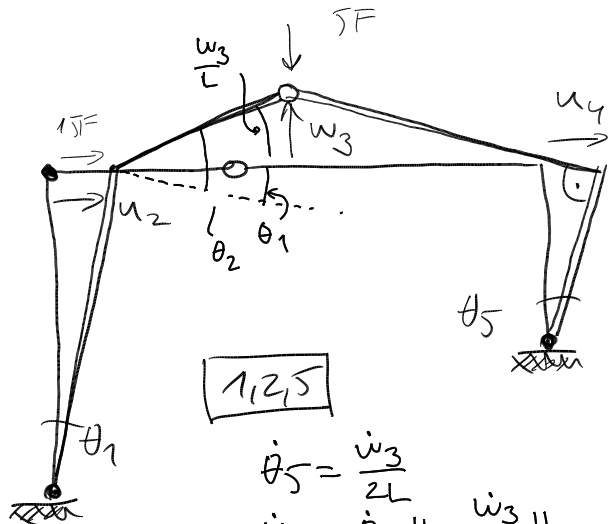
$$\dot{\theta}_2 = \frac{\dot{w}_3}{L} \quad \dot{\theta}_4 = \frac{\dot{w}_3}{2L}$$

$$F_{ext} = 5F \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$5F \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



$$1,25$$

$$\dot{\theta}_5 = \frac{\dot{w}_3}{2L}$$

$$\dot{u}_4 = \dot{\theta}_5 \cdot H = \frac{\dot{w}_3}{2L} H$$

$$\dot{u}_2 = \dot{u}_4$$

$$\dot{\theta}_1 = \frac{\dot{u}_4}{2H} = \frac{\dot{w}_3}{4L}$$

$$\dot{\theta}_2 = \frac{\dot{w}_3}{4L} + \frac{\dot{w}_3}{L}$$

$$F_{ext} = 15F \cdot \frac{\dot{w}_3}{2} - 5F \dot{w}_3 = 25F \dot{w}_3$$

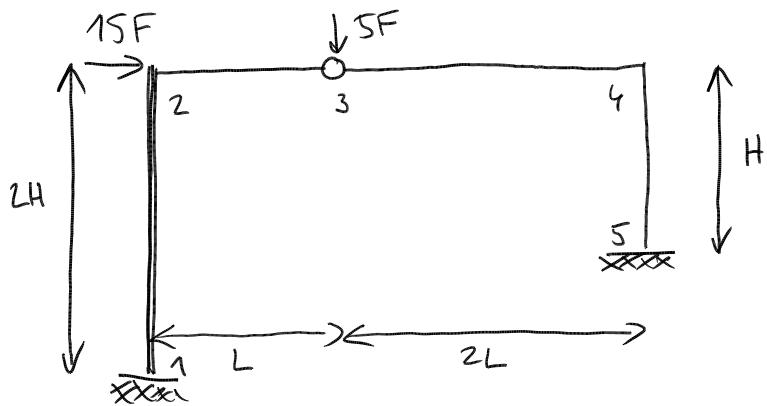
$$D_{int} = 200 \frac{\dot{w}_3}{16} + 150 \dot{w}_3 \left( \frac{1}{16} + \frac{1}{4} \right) + \frac{150 \dot{w}_3}{8}$$

$$= 78,125 \dot{w}_3$$

$$\rightarrow F_{ext} = D_{int}$$

$$25F \dot{w}_3 = 78,125 \dot{w}_3$$

$$\rightarrow F = 31,25$$

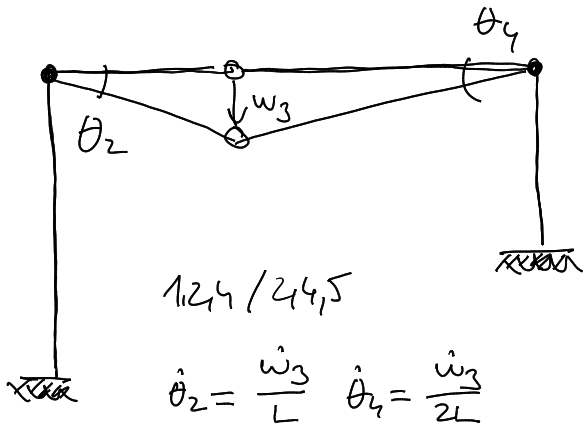


$$L = H = 4\text{m}$$

$$M_0 = 150\text{kNm}$$

$$M_0^2 = 200\text{kNm}$$

- analiza všech kinematických příp. mechanismů
- F v mezním plast. stavu
- $M, U, N$  + reakce



$$1,24 / 44,5$$

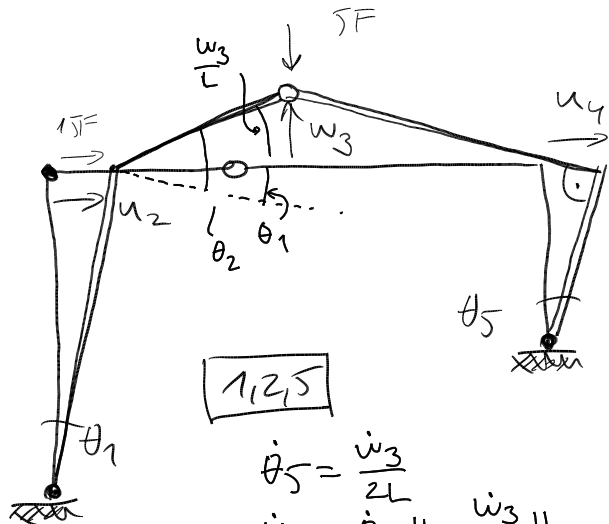
$$\dot{\theta}_2 = \frac{\dot{w}_3}{L} \quad \dot{\theta}_4 = \frac{\dot{w}_3}{2L}$$

$$F_{ext} = SF \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$SF \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



$$1,25$$

$$\dot{\theta}_5 = \frac{\dot{w}_3}{2L}$$

$$\dot{u}_4 = \dot{\theta}_5 \cdot H = \frac{\dot{w}_3}{2L} H$$

$$\dot{u}_2 = \dot{u}_4$$

$$\dot{\theta}_1 = \frac{\dot{u}_4}{2H} = \frac{\dot{w}_3}{4L}$$

$$\dot{\theta}_2 = \frac{\dot{w}_3}{4L} + \frac{\dot{w}_3}{L}$$

$$F_{ext} = 15F \cdot \frac{\dot{w}_3}{2} - SF \dot{w}_3 = 25F \dot{w}_3$$

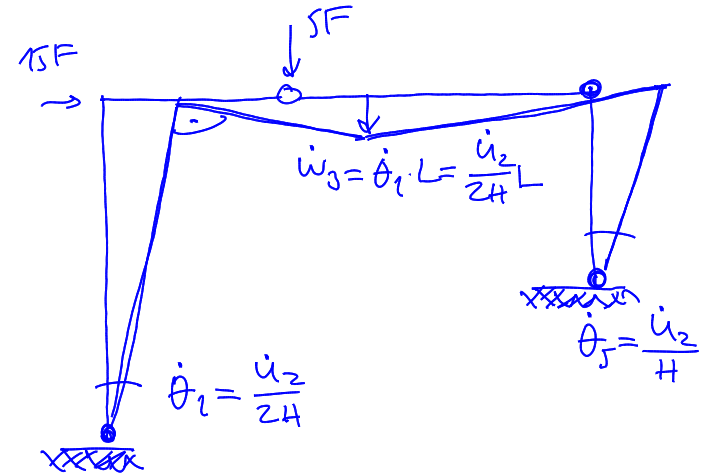
$$D_{int} = 200 \frac{\dot{w}_3}{16} + 150 \dot{w}_3 \left( \frac{1}{16} + \frac{1}{4} \right) + \frac{150 \dot{w}_3}{8}$$

$$= 78,125 \dot{w}_3$$

$$\rightarrow F_{ext} = D_{int}$$

$$25F \dot{w}_3 = 78,125 \dot{w}_3$$

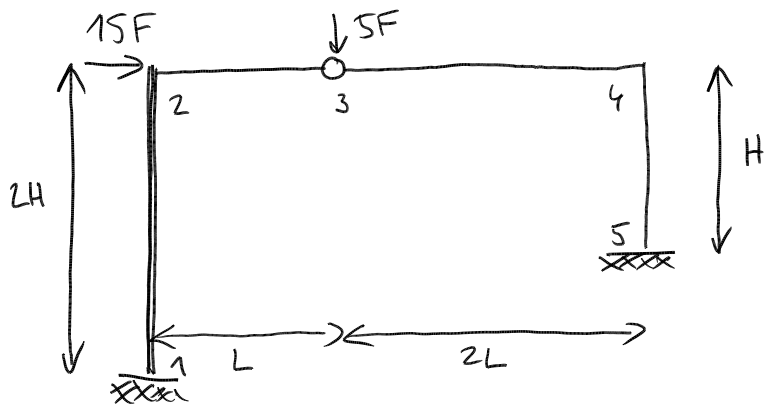
$$\rightarrow F = 31,25$$



$$\dot{\theta}_1 = \frac{\dot{u}_2}{2H}$$

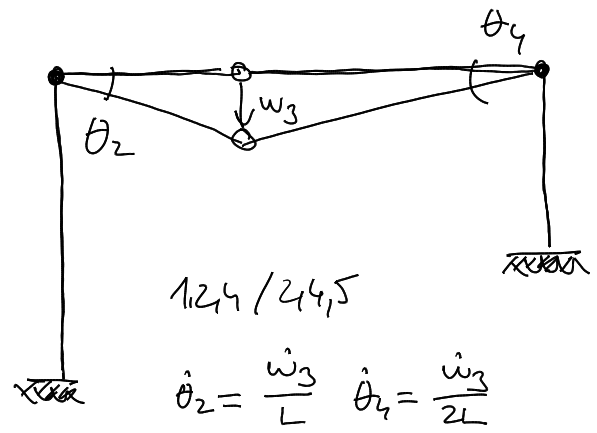
$$\dot{w}_3 = \dot{\theta}_1 \cdot L = \frac{\dot{u}_2}{2H} L$$

$$\dot{\theta}_5 = \frac{\dot{u}_2}{H}$$



$L = H = 4\text{m}$   
 $M_0 = 150\text{kNm}$   
 $M_0^2 = 200\text{kNm}$

→ analiza všech kinematických příp. mechanismů  
 → F v mezním plast. stavu  
 →  $M, U, N$  + reakce



1,2,4 / 2,4,5

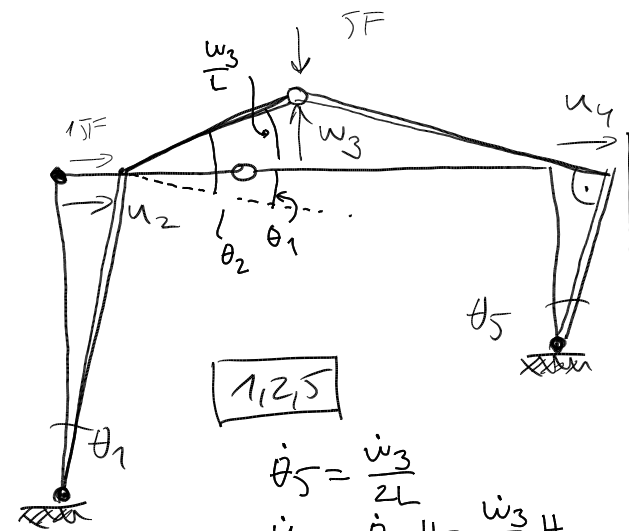
$$\dot{\theta}_2 = \frac{\dot{w}_3}{L} \quad \dot{\theta}_4 = \frac{\dot{w}_3}{2L}$$

$$F_{ext} = SF \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$SF \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



1,2,5

$$\dot{\theta}_5 = \frac{\dot{w}_3}{2L}$$

$$\dot{u}_4 = \dot{\theta}_5 \cdot H = \frac{\dot{w}_3}{2L} H$$

$$\dot{u}_2 = \dot{u}_4$$

$$\dot{\theta}_1 = \frac{\dot{u}_4}{2H} = \frac{\dot{w}_3}{4L}$$

$$\dot{\theta}_2 = \frac{\dot{w}_3}{4L} + \frac{\dot{w}_3}{L}$$

$$F_{ext} = 15F \cdot \frac{\dot{w}_3}{2} - SF \dot{w}_3 = 25F \dot{w}_3$$

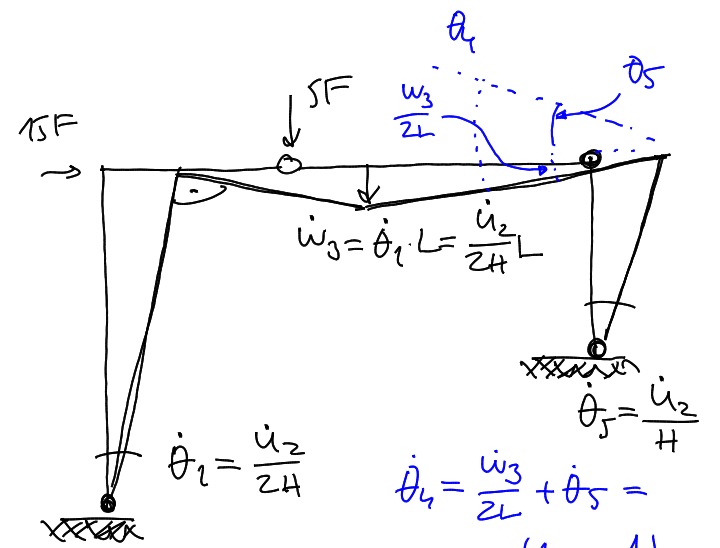
$$D_{int} = 200 \frac{\dot{w}_3}{16} + 150 \dot{w}_3 \left( \frac{1}{16} + \frac{1}{4} \right) + \frac{150 \dot{w}_3}{8}$$

$$= 78,125 \dot{w}_3$$

$$\rightarrow F_{ext} = D_{int}$$

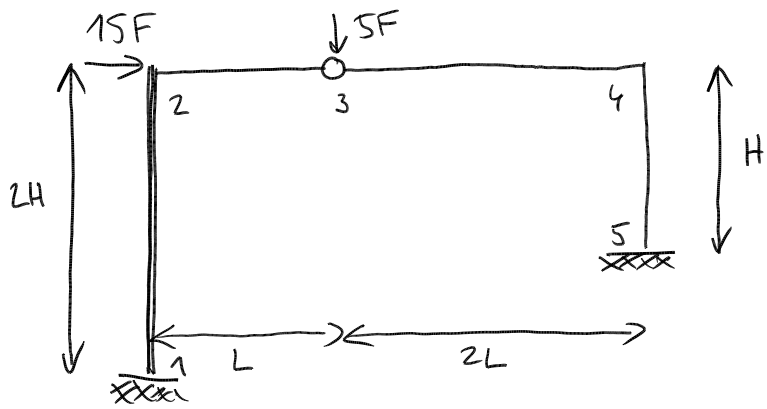
$$25F \dot{w}_3 = 78,125 \dot{w}_3$$

$$\rightarrow F = 31,25$$



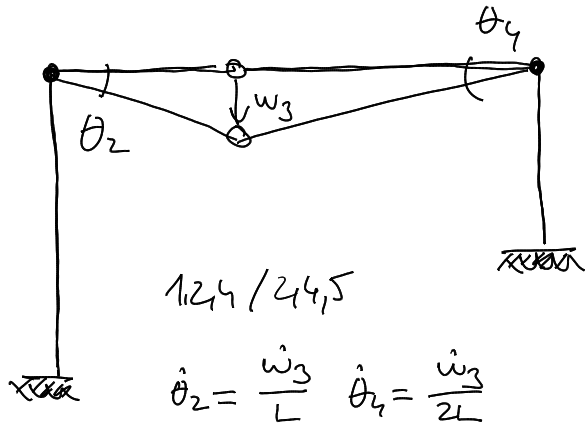
$$\dot{\theta}_1 = \frac{\dot{u}_2}{2H}$$

$$\dot{\theta}_4 = \frac{\dot{w}_3}{2L} + \dot{\theta}_5 = \dot{u}_2 \left( \frac{1}{4H} + \frac{1}{H} \right)$$



$L = H = 4\text{m}$   
 $M_0 = 150\text{kNm}$   
 $M_0^2 = 200\text{kNm}$

- analiza všech kinematických příp. mechanismů
- F v mezním plast. stavu
- $M, U, N$  + reakce



1,2,4 / 2,4,5

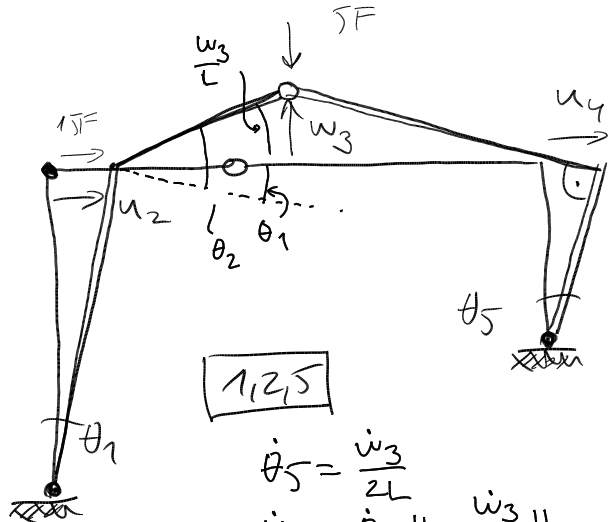
$$\dot{\theta}_2 = \frac{\dot{w}_3}{L} \quad \dot{\theta}_4 = \frac{\dot{w}_3}{2L}$$

$$F_{ext} = SF \dot{w}_3$$

$$D_{int} = 150 \cdot \frac{\dot{w}_3}{4} + 150 \frac{\dot{w}_3}{8} = 56,25 \dot{w}_3$$

$$F_{ext} = D_{int}$$

$$SF \dot{w}_3 = 56,25 \dot{w}_3 \rightarrow F = 11,25$$



1,2,5

$$\dot{\theta}_5 = \frac{\dot{w}_3}{2L}$$

$$\dot{u}_4 = \dot{\theta}_5 \cdot H = \frac{\dot{w}_3}{2L} H$$

$$\dot{u}_2 = \dot{u}_4$$

$$\dot{\theta}_1 = \frac{\dot{u}_4}{2H} = \frac{\dot{w}_3}{4L}$$

$$\dot{\theta}_2 = \frac{\dot{w}_3}{4L} + \frac{\dot{w}_3}{L}$$

$$F_{ext} = 15F \cdot \frac{\dot{w}_3}{2} - SF \dot{w}_3 = 25F \dot{w}_3$$

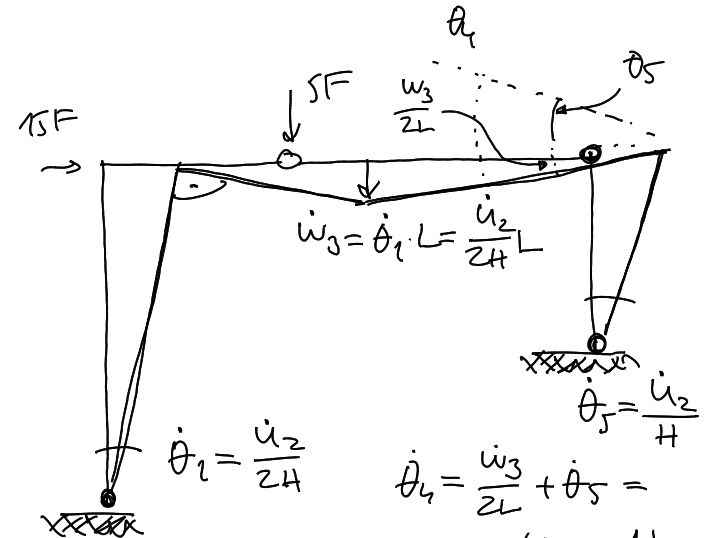
$$D_{int} = 200 \frac{\dot{w}_3}{16} + 150 \dot{w}_3 \left( \frac{1}{16} + \frac{1}{4} \right) + \frac{150 \dot{w}_3}{8}$$

$$= 78,125 \dot{w}_3$$

$$\rightarrow F_{ext} = D_{int}$$

$$25F \dot{w}_3 = 78,125 \dot{w}_3$$

$$\rightarrow F = 3,125$$



$$\dot{\theta}_1 = \frac{\dot{u}_2}{2H}$$

$$\dot{\theta}_4 = \frac{\dot{w}_3}{2L} + \dot{\theta}_5 =$$

$$= \dot{u}_2 \left( \frac{1}{4H} + \frac{1}{H} \right)$$

$$F_{ext} = 15F \cdot \dot{u}_2 + SF \cdot \frac{\dot{u}_2}{2} = 17,5 \dot{u}_2 F$$

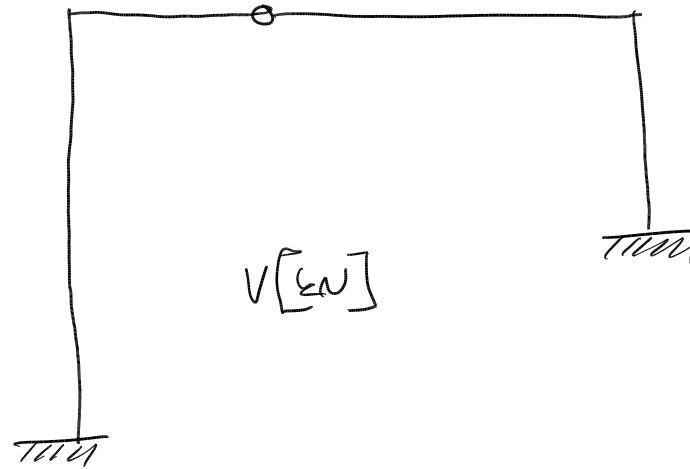
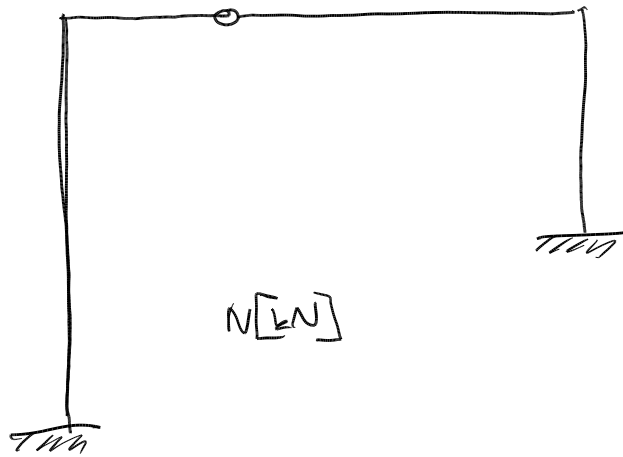
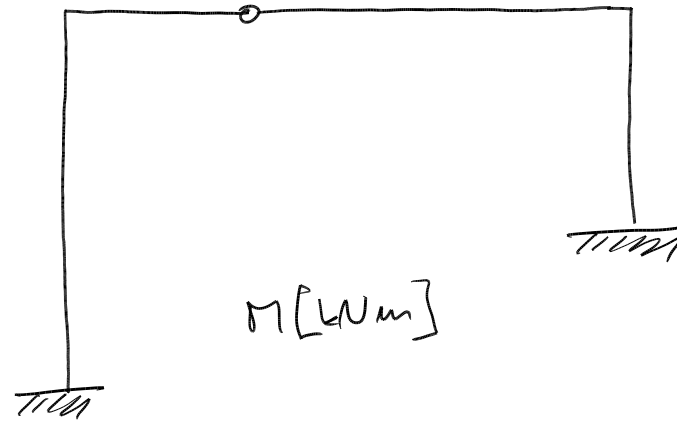
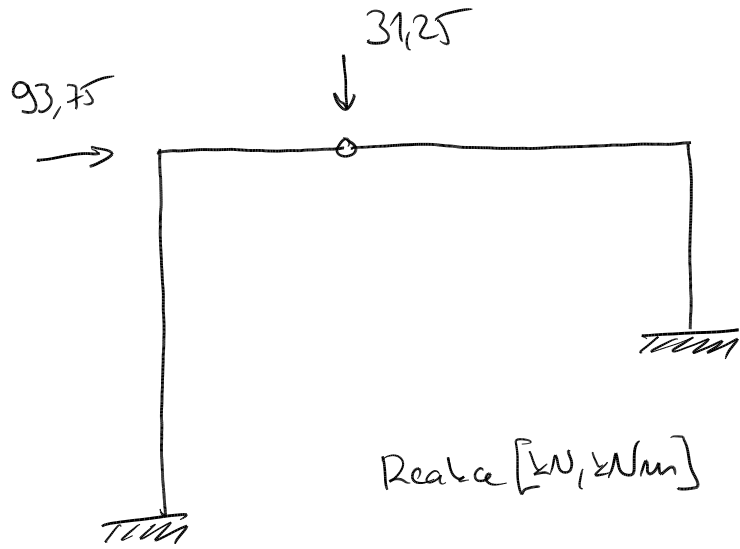
$$D_{int} = 200 \cdot \frac{\dot{u}_2}{8} + 150 \dot{u}_2 \left( \frac{1}{16} + \frac{1}{4} \right) + 150 \frac{\dot{u}_2}{4} =$$

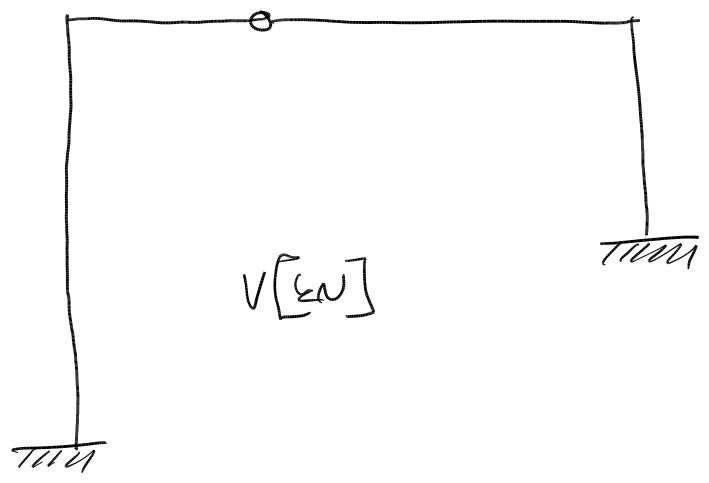
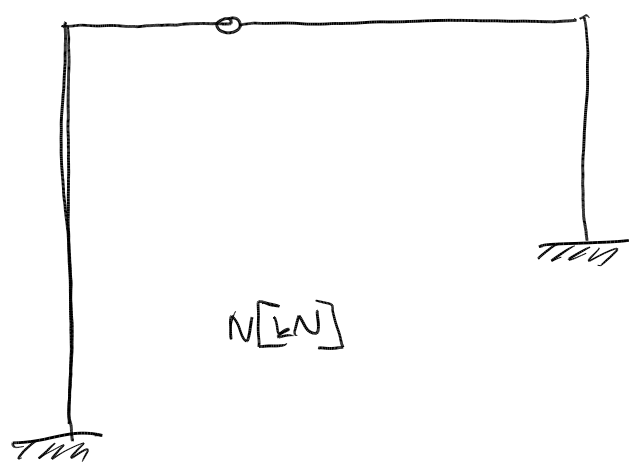
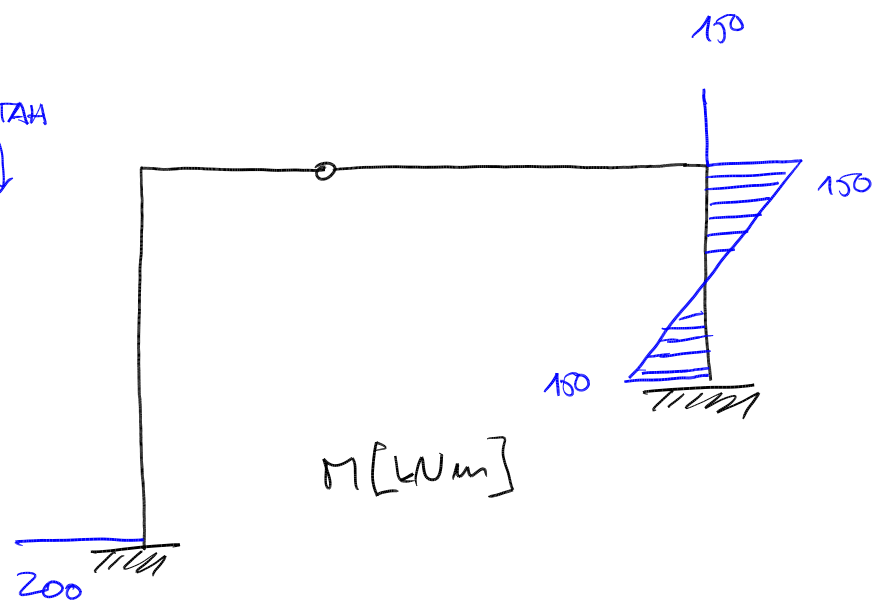
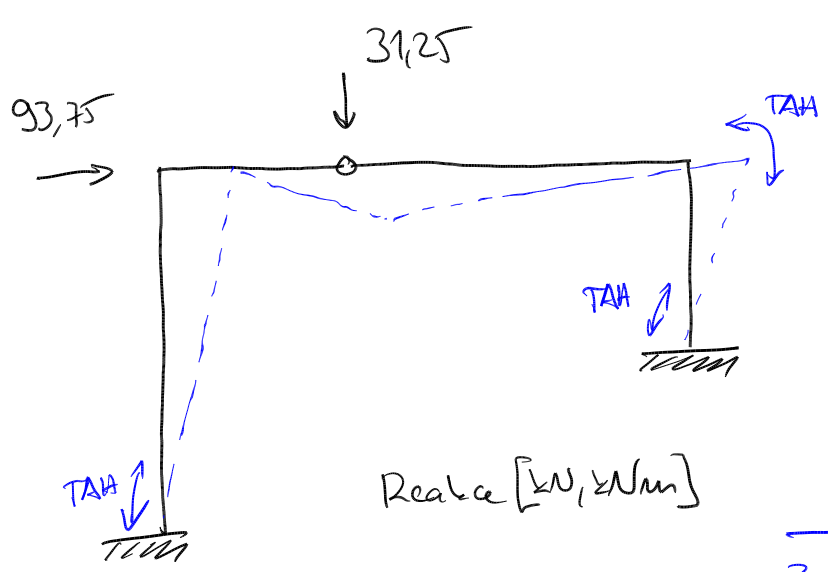
$$= 109,375 \dot{u}_2$$

$$F_{ext} = D_{int}$$

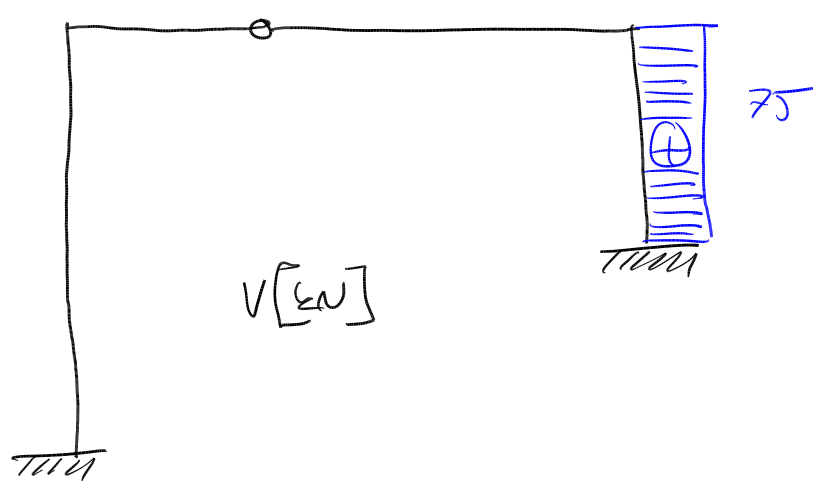
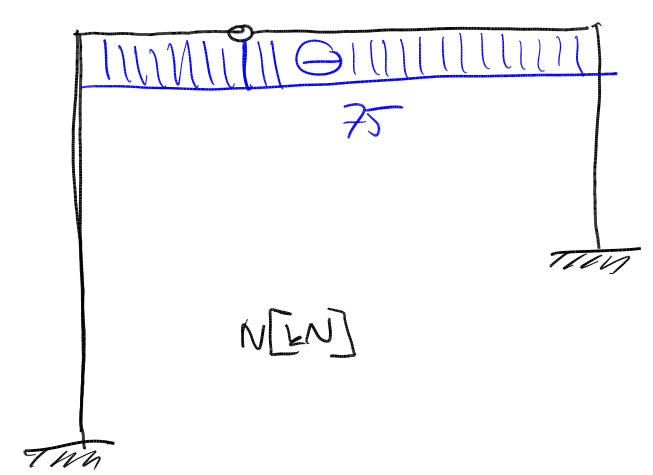
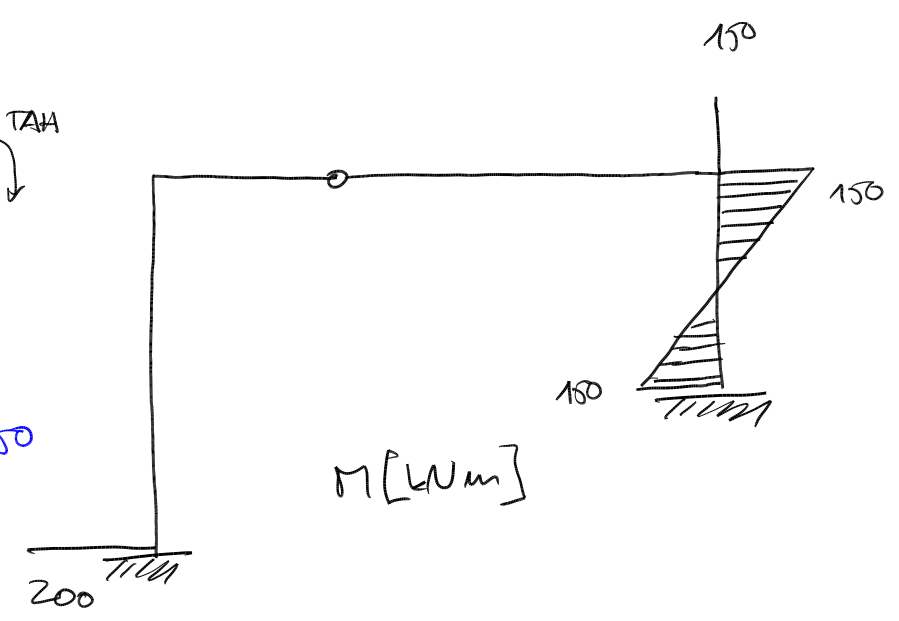
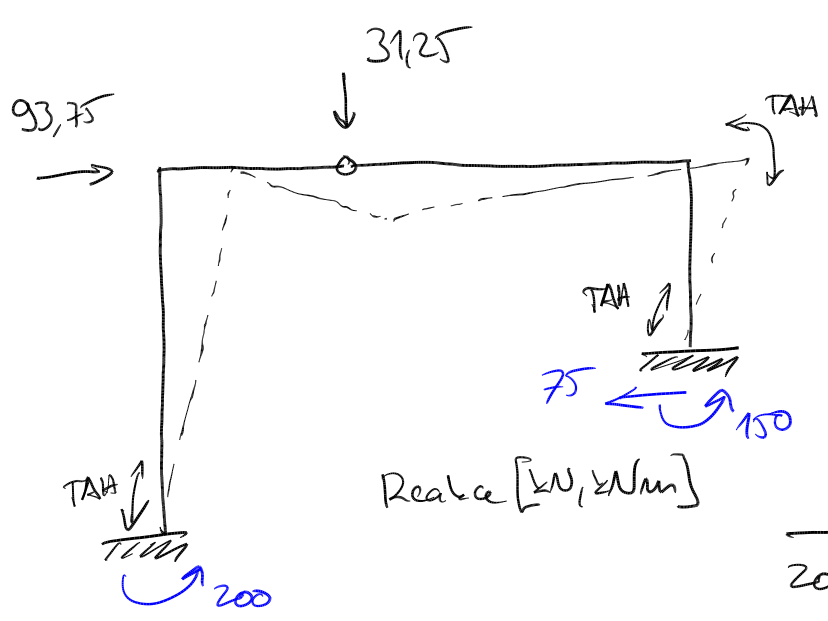
$$17,5 \dot{u}_2 F = 109,375 \dot{u}_2$$

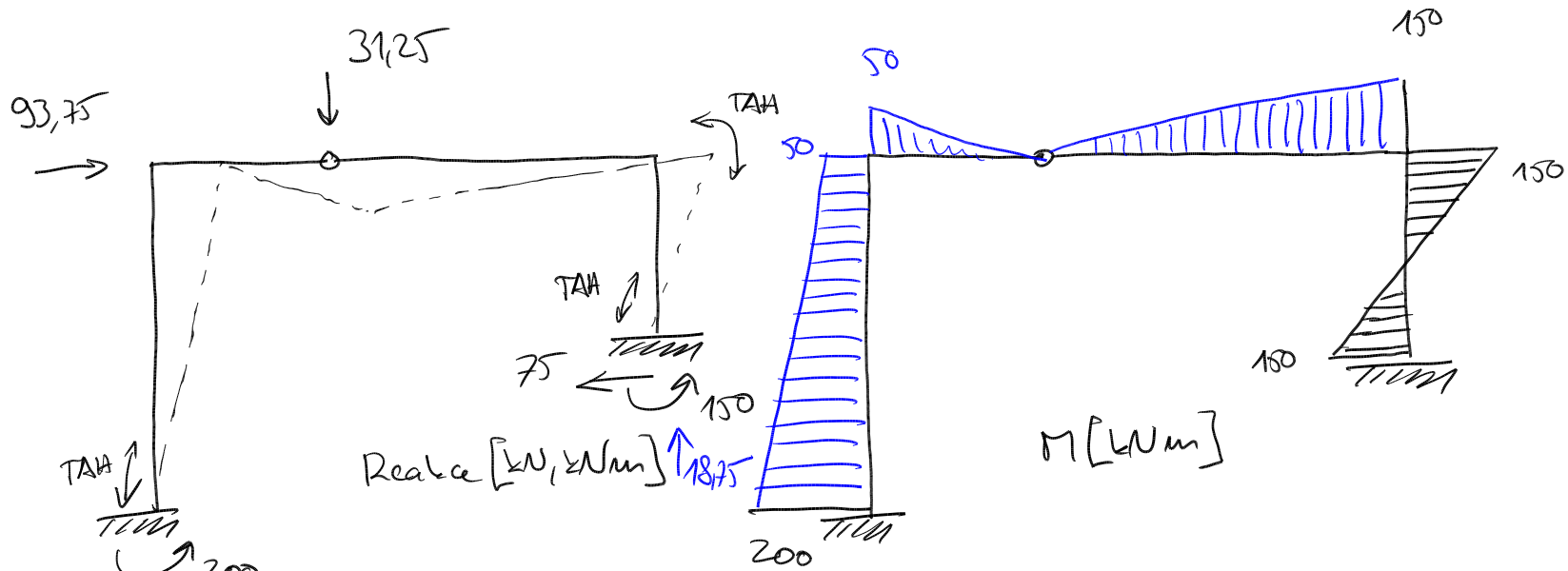
$$\rightarrow F = 6,25$$





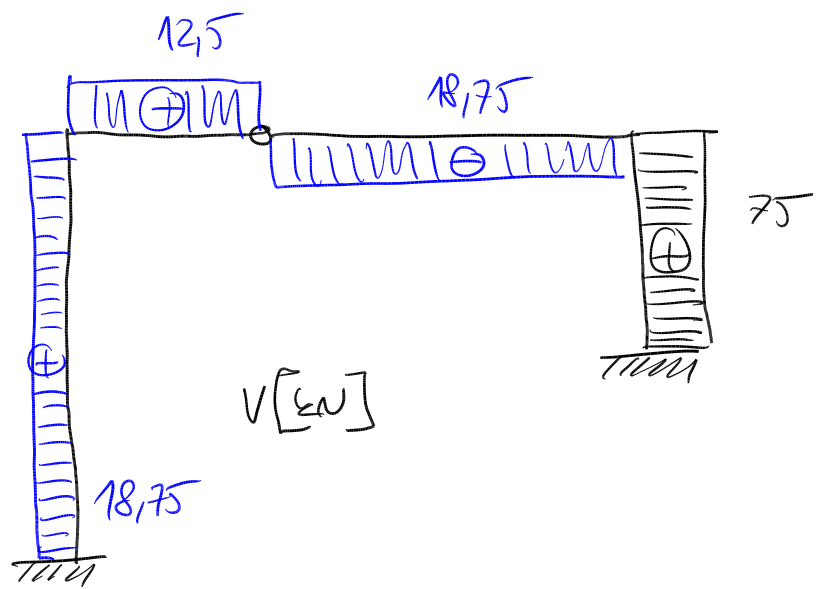
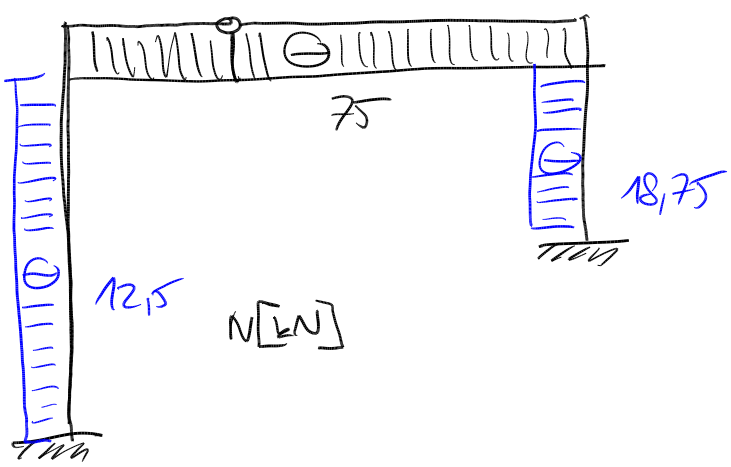


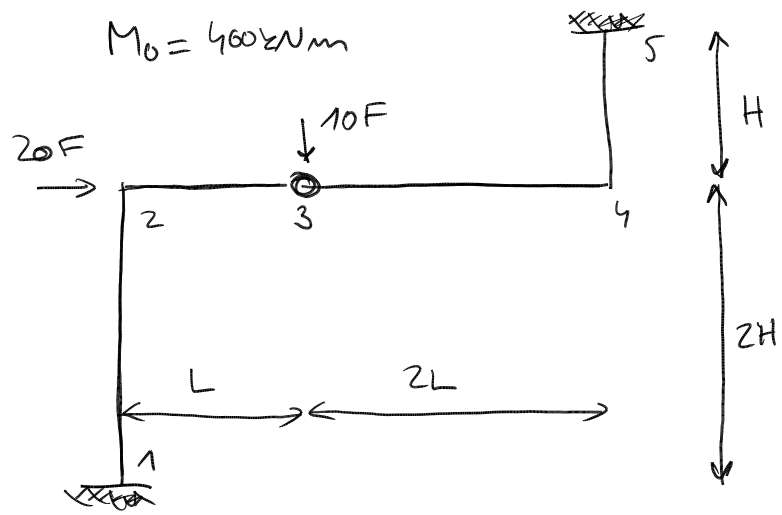




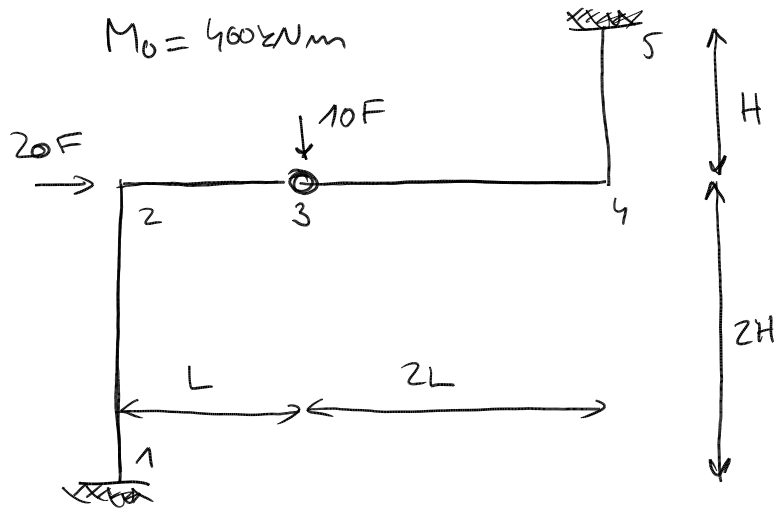
Reactions [kN, kNm]  
 12,5 ↑  
 18,75 ←  
 200 ↻

Reactions [kN, kNm]  
 18,75 ↑





$$L = H = 2 \text{ m}$$

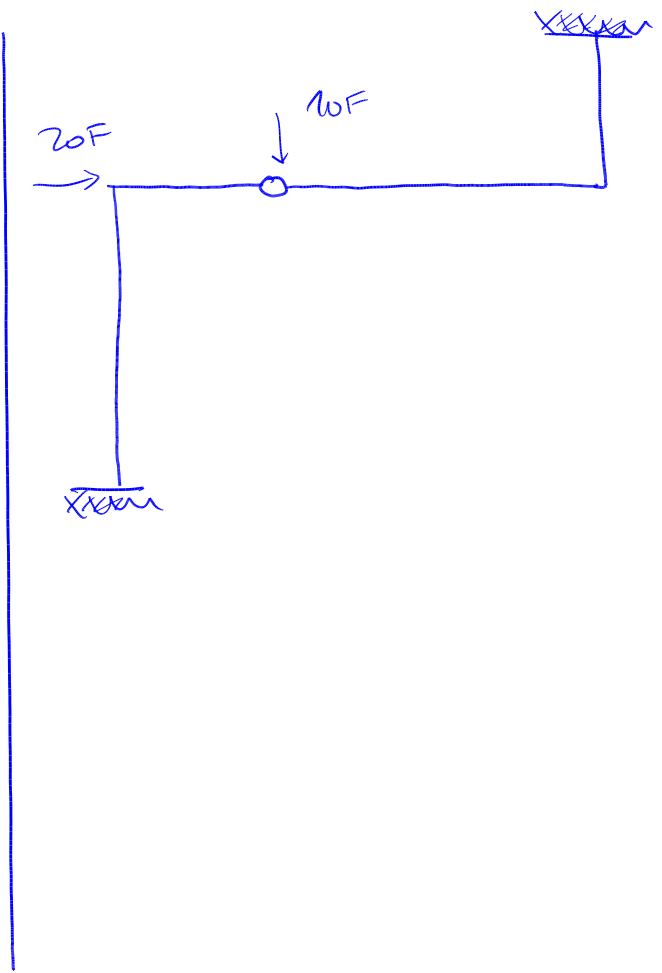
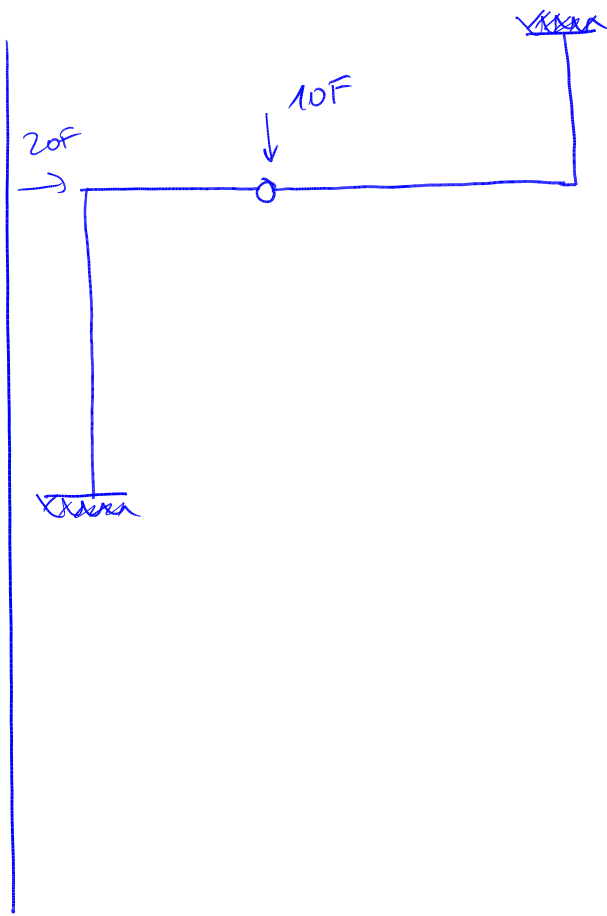
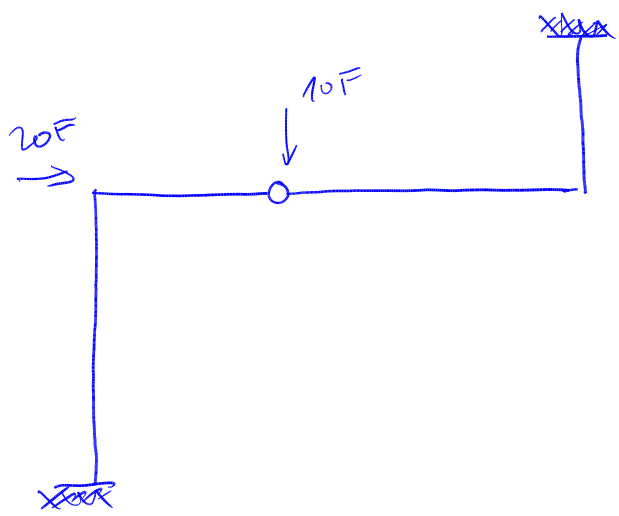


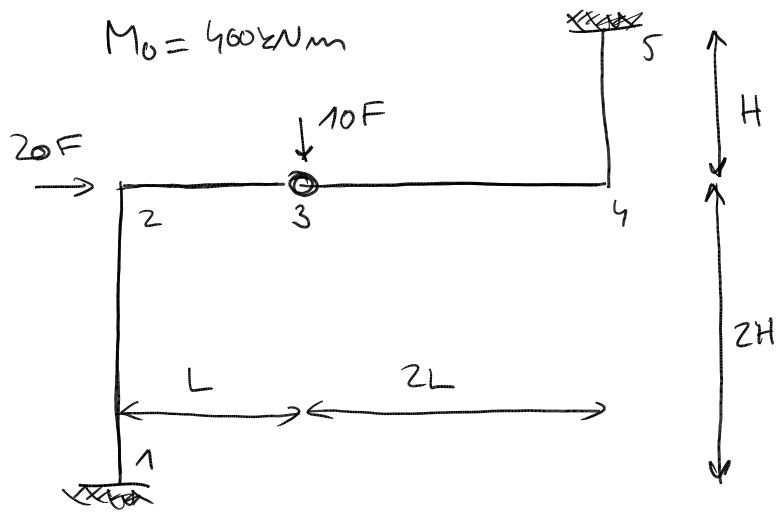
$L = H = 2 \text{ m}$

4 kritické průřezy  
 2x SN  $\rightarrow$  3 plast. klasy

4 kombinace

$\left. \begin{array}{l} 1, 2, 4 \\ 1, 2, 5 \\ 1, 4, 5 \\ 2, 4, 5 \end{array} \right\} \text{ekvivalentní}$





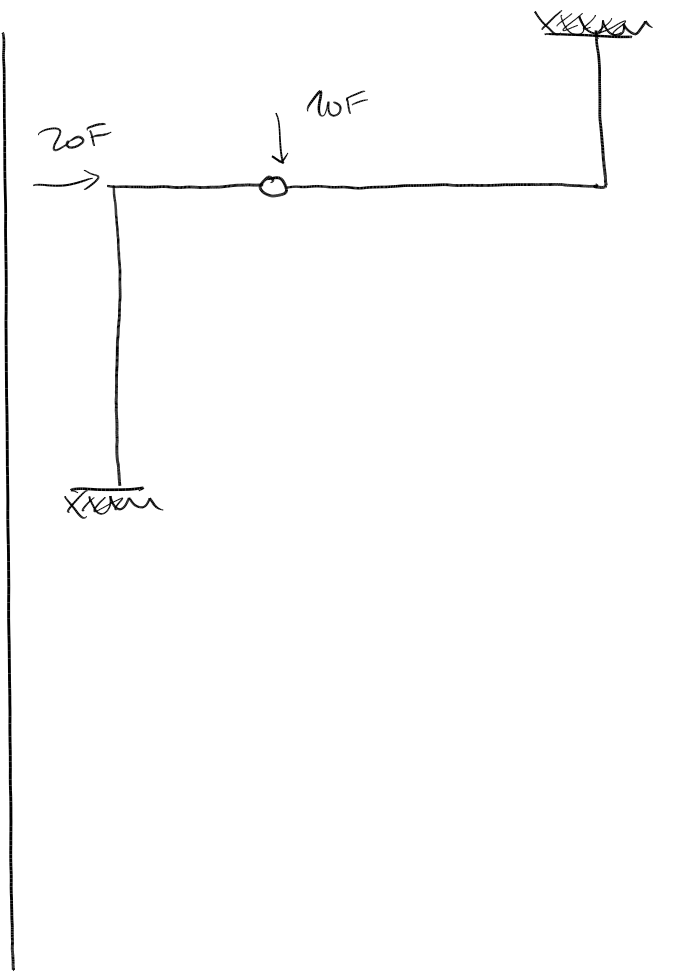
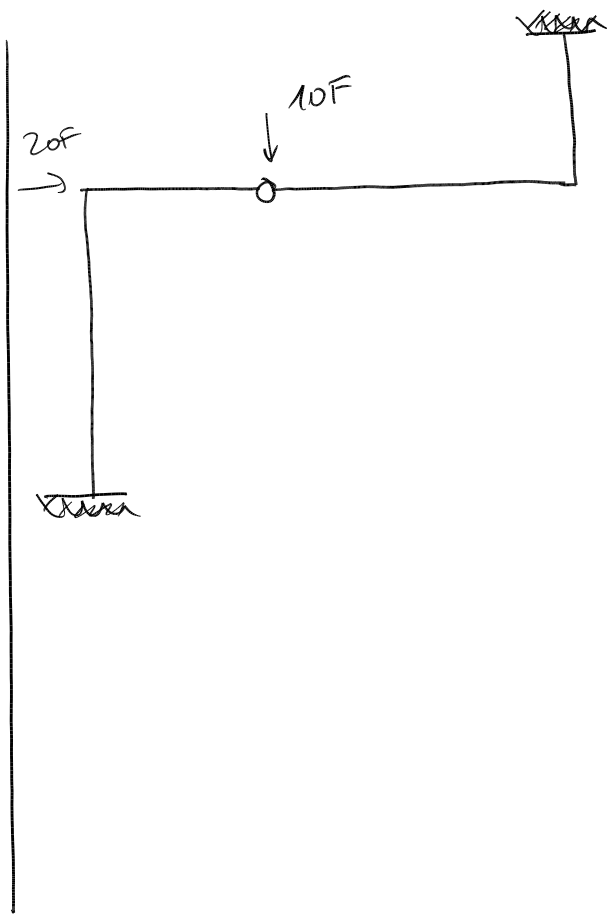
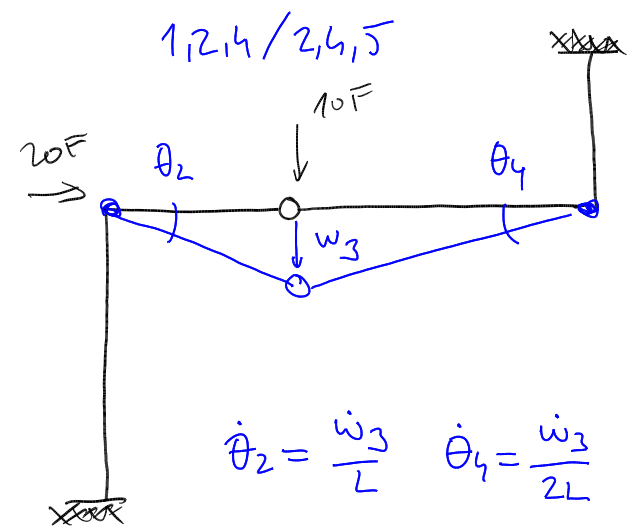
$L = H = 2 \text{ m}$

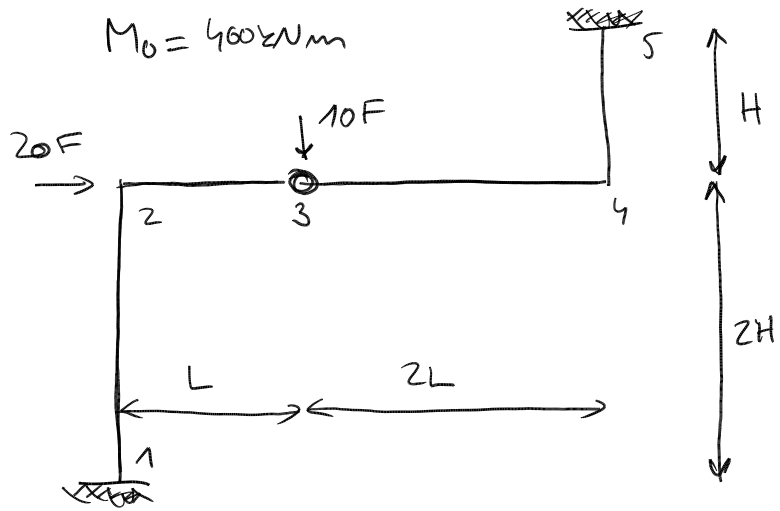
4 kritické prvky

2x SN  $\rightarrow$  3 plast. klady

4 kombinace

- 1, 2, 4
  - 1, 2, 5
  - 1, 4, 5
  - 2, 4, 5
- ekvivalenci





$L = H = 2 \text{ m}$

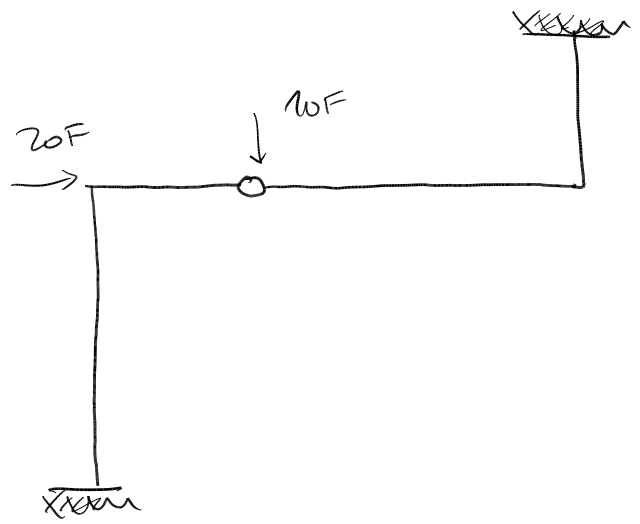
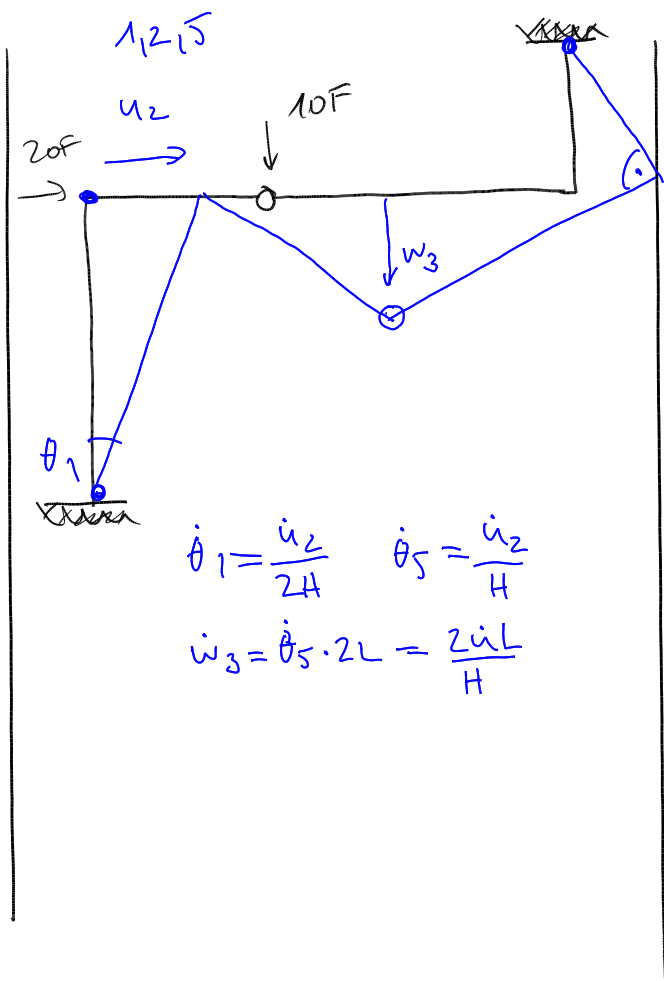
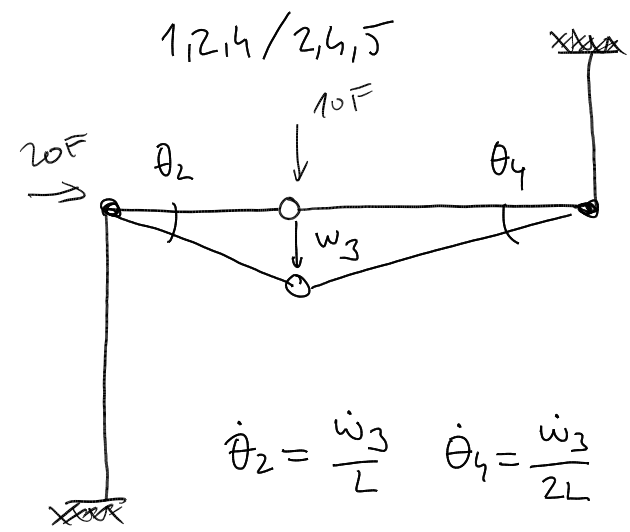
4 kritické prvky

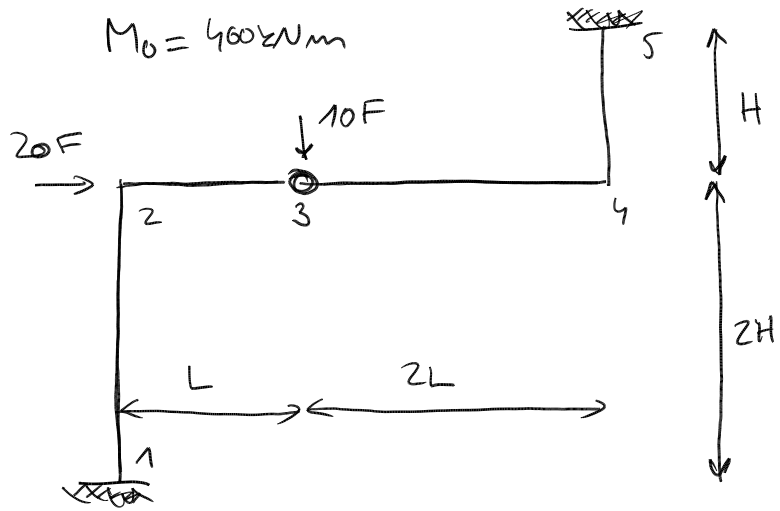
2x SN  $\rightarrow$  3 plast. klady

4 kombinace

- 1, 2, 4, 5
- 1, 2, 5
- 1, 4, 5
- 2, 4, 5

ekvivalentní

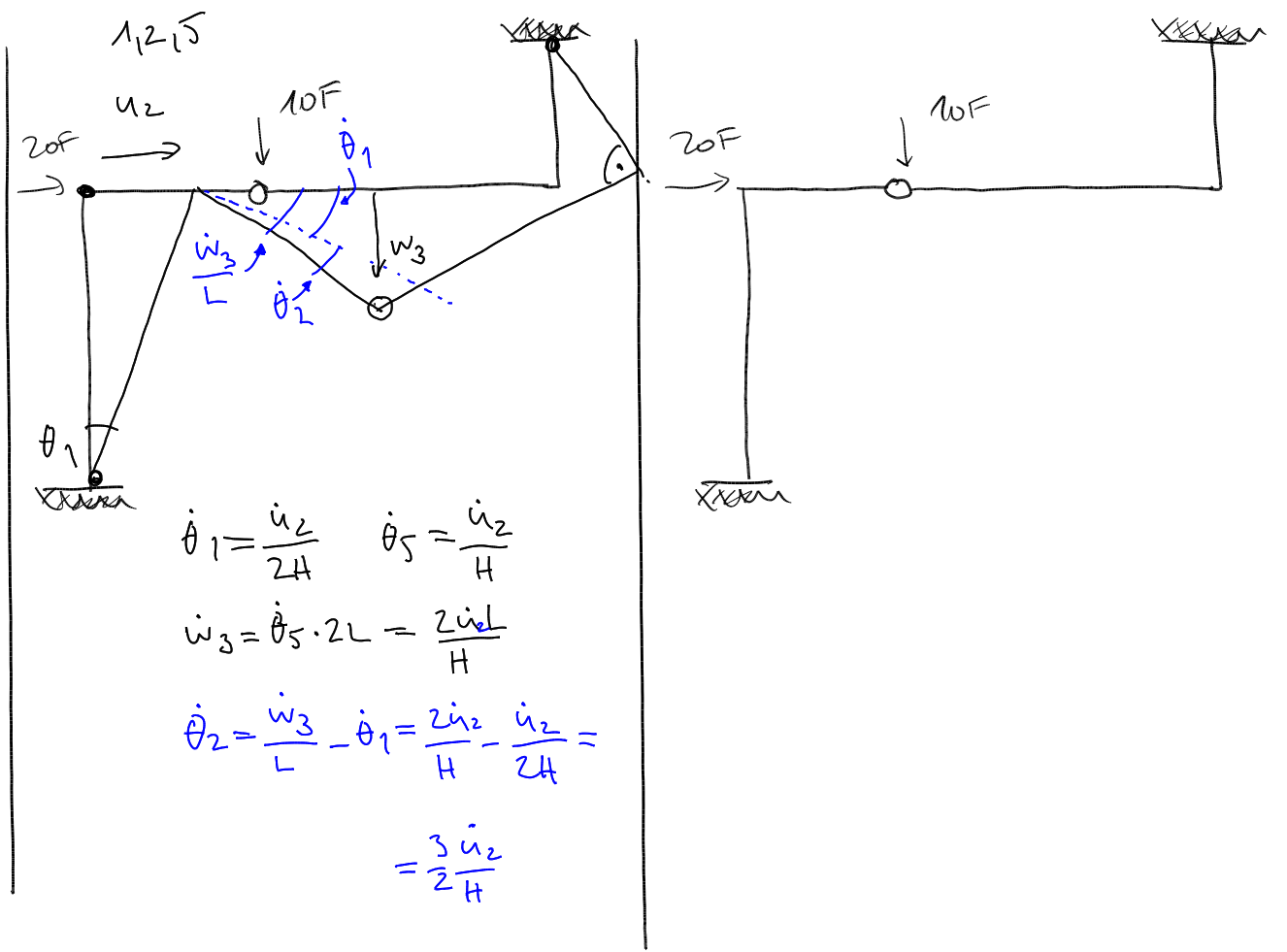
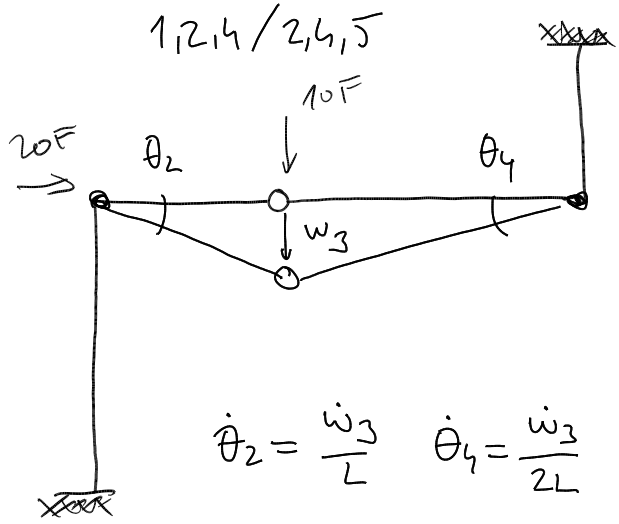


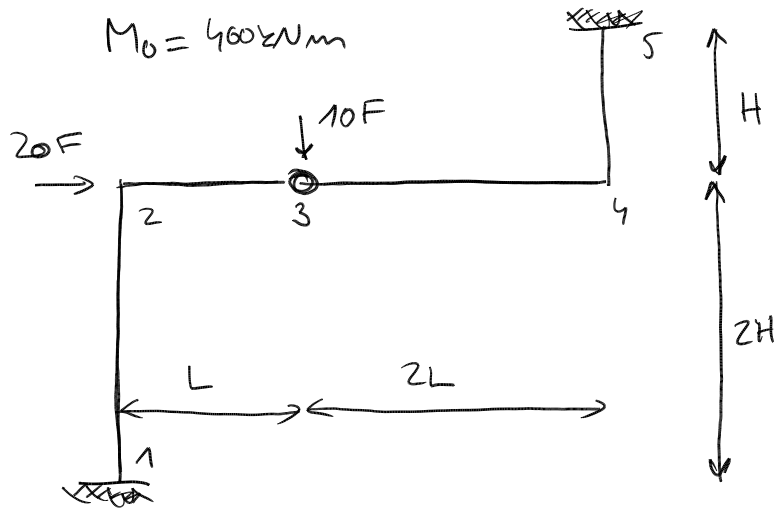


$L = H = 2 \text{ m}$

4 kritické prvky  
 $2 \times SN \rightarrow 3$  plast. klasy

4 kombinace  $\left. \begin{array}{l} 1,2,4,5 \\ 1,2,5 \\ 1,4,5 \\ 2,4,5 \end{array} \right\}$  ekvivalentní

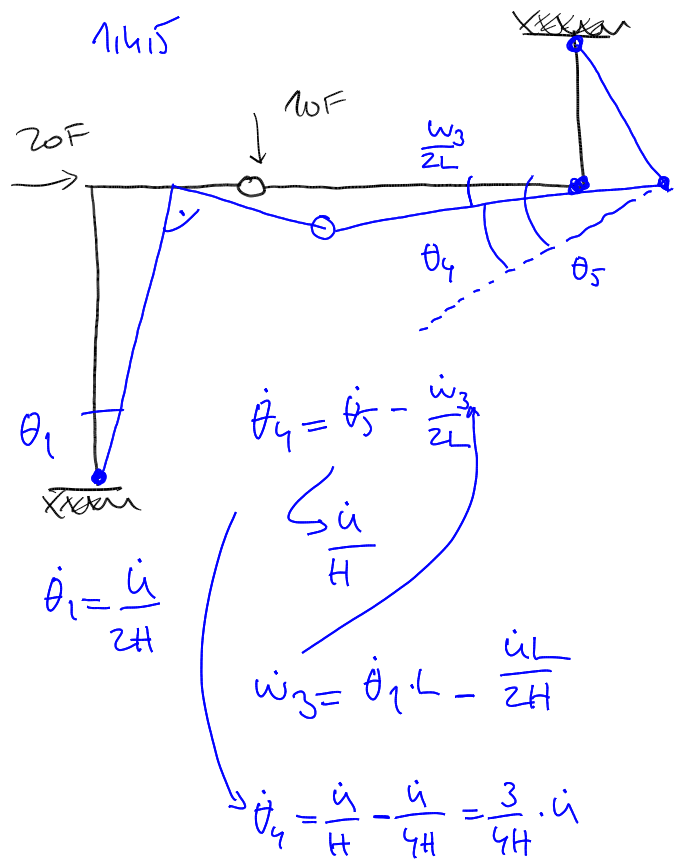
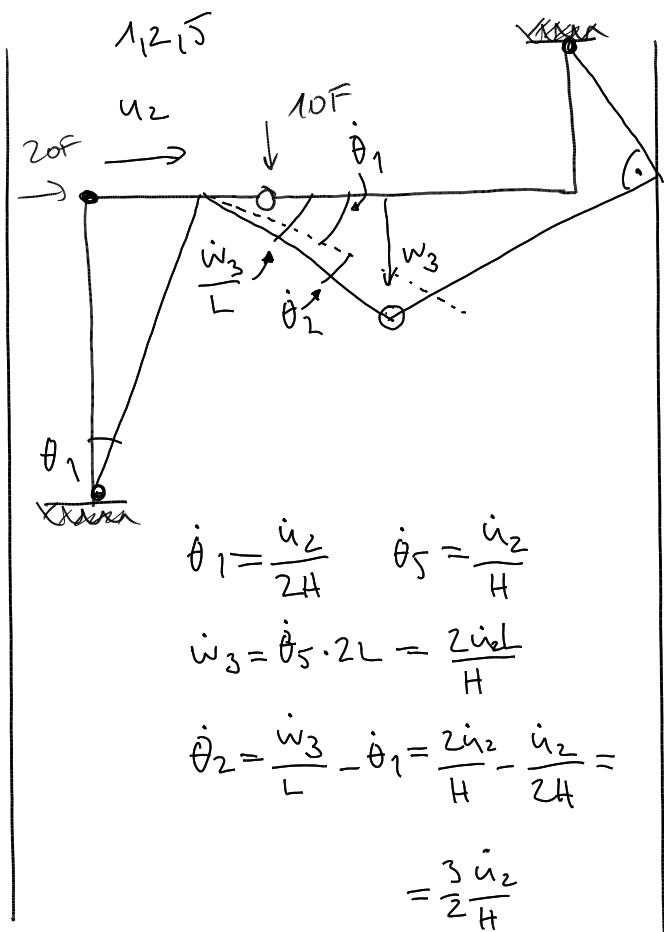
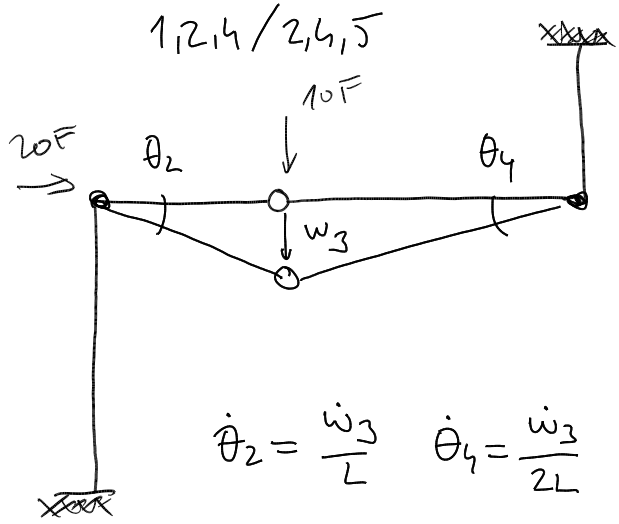




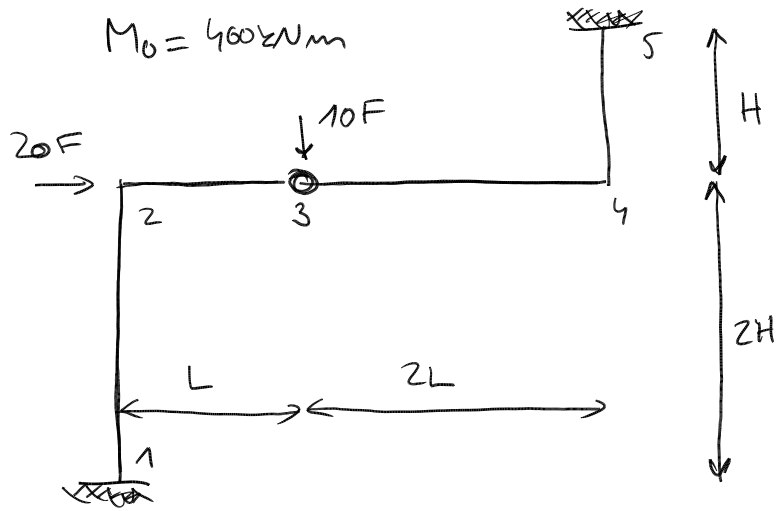
$L = H = 2 \text{ m}$

4 kritické prúžky  
 2x SN  $\rightarrow$  3 plast. klady

4 kombinácie } ekvivalencie  
 1,2,4,5  
 1,2,5  
 1,4,5  
 2,4,5



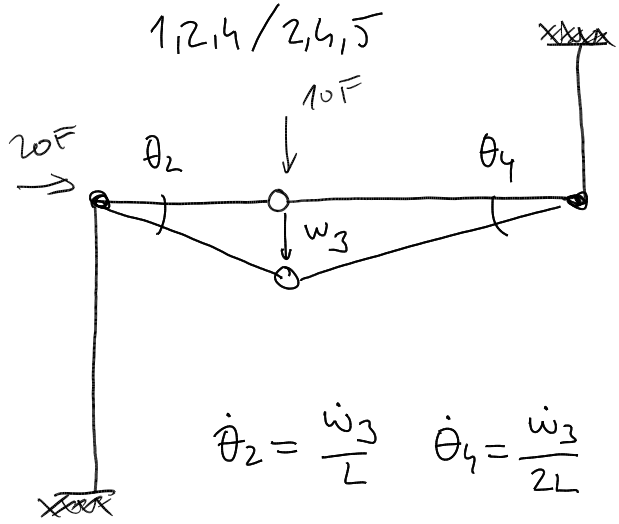




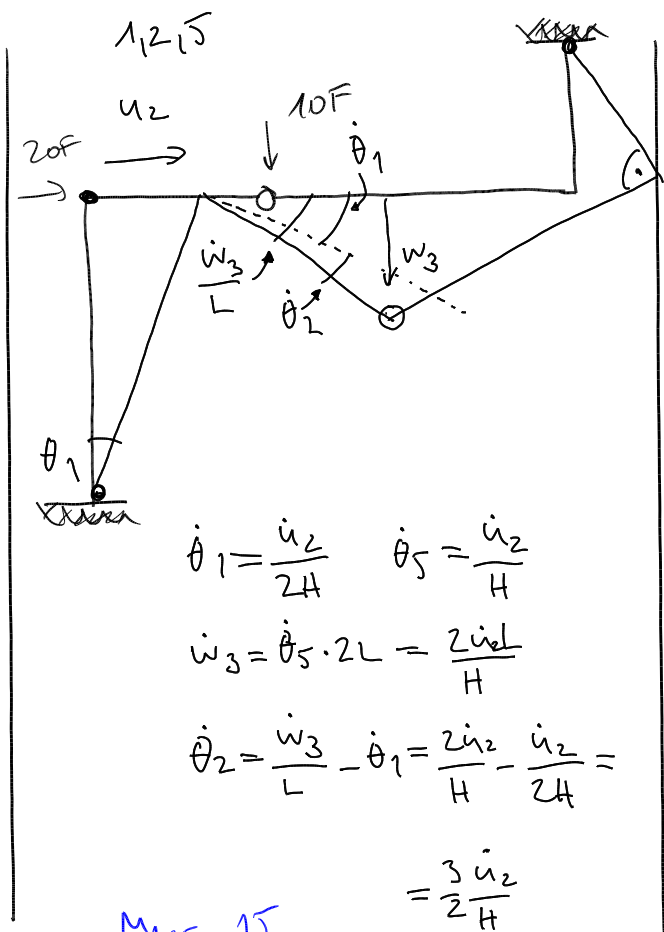
$L = H = 2 \text{ m}$

4 kritické prvky  
 2x SN  $\rightarrow$  3 plast. klasy

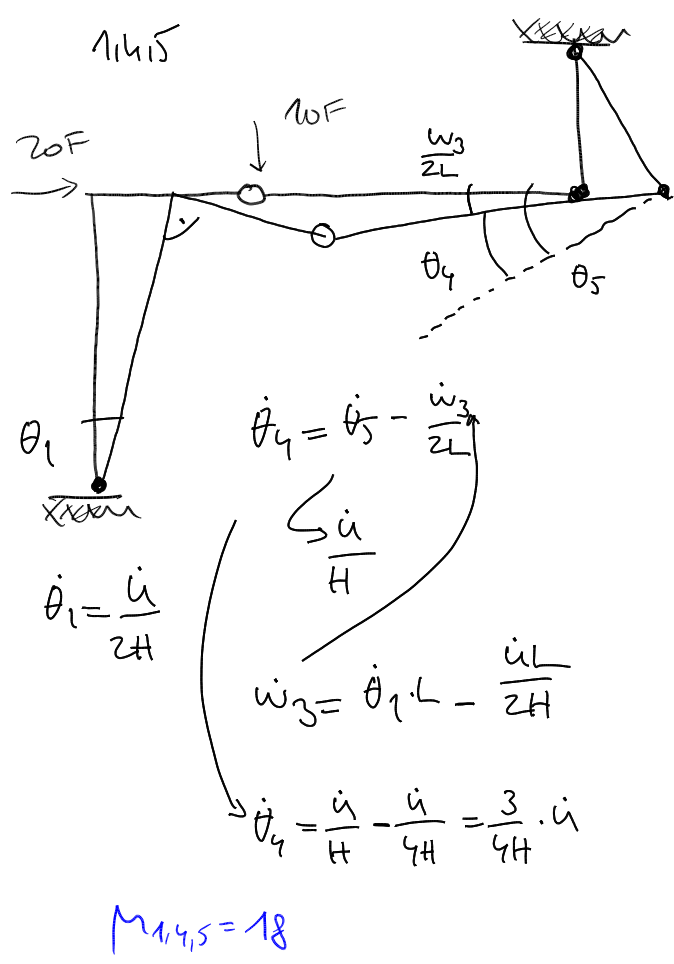
4 kombinace  $\left. \begin{array}{l} 1,2,4 \\ 1,2,5 \\ 1,4,5 \\ 2,4,5 \end{array} \right\}$  ekvivalentní



$M_{2,4} = 30$



$M_{1,2,5} = 15$



$M_{1,4,5} = 18$