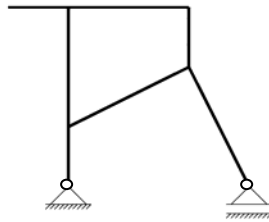
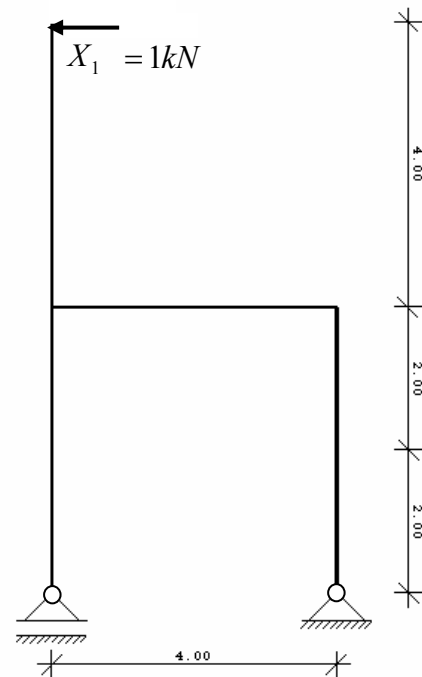
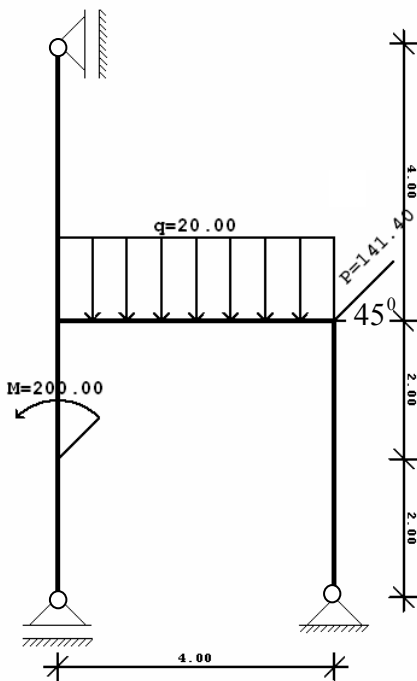


1. Odrediti stupanj statičke neodređenosti zadanog sustava te presijecanjem unutarnjih i vanjskih veza nacrtati dva statički određena sustava. (10 bodova)



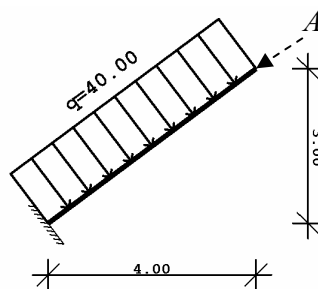
2. Za sustav na slici **METODOM SILA** odrediti dijagrame unutarnjih sila (M_K , T_K i N_K). Pri izračunu koeficijenta fleksibilnosti uzeti u obzir utjecaj **SAMO momenata savijanja** na deformiranje sustava. EI je konstantan za cijeli sustav. (50 bodova). ($m_I=10; M_v=10; M_K, T_K, N_K=3*5=15; a_{II}=6; a_{IV}=6; X_I=3$)

Za izračunavanje koristiti **zadani osnovni sustav**.

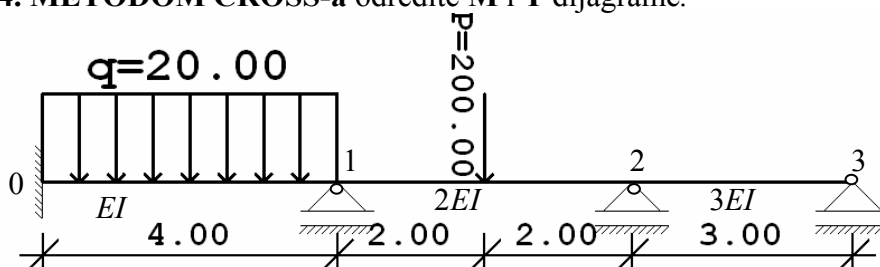


osnovni sustav za rješavanje

3. Odredite vrijednost **kut zaokreta** točke A. Dimenzije elemenata su 20/30 cm, $E = 3.15 \cdot 10^7$ kN/m² (15 bodova)



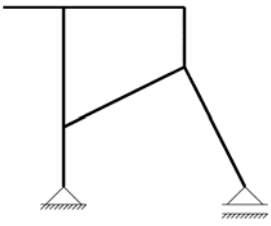
4. **METODOM CROSS-a** odredite **M** i **T** dijagrame.



NAPOMENA: ZA PROLAZ NA USMENI DIO ISPITA TREBA SAKUPITI 50 I VIŠE BODOVA ALI ZADATAK IZ METODE SILA MORA BITI BODOVAN S NAJMANJE 25 BODOVA!!!!

PRORAČUN KONSTRUKCIJA
7. rujna 2006. godine

1. zadatak - neodređenost

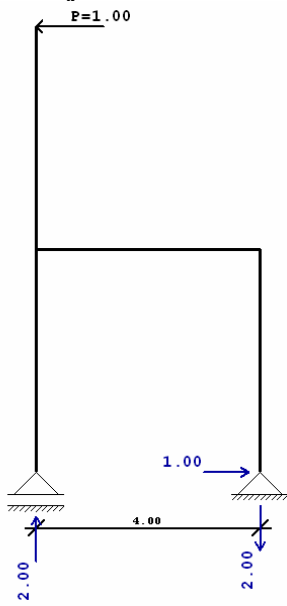


3 puta neodređen

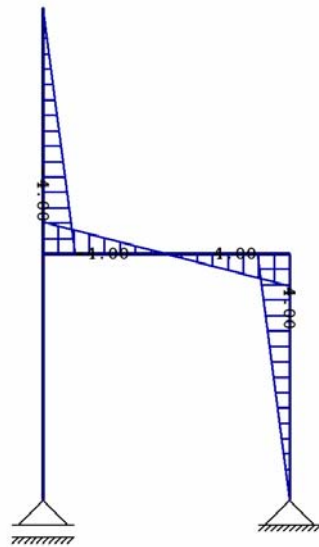
2. Zadatak METODA SILA

OSNOVNI SUSTAV

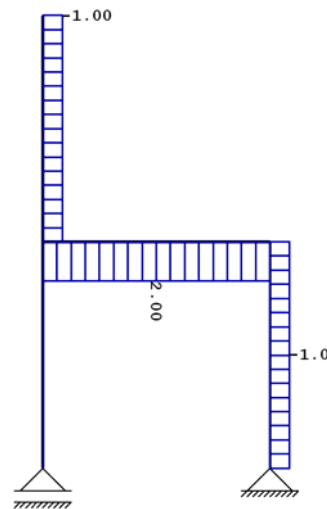
Reakcije



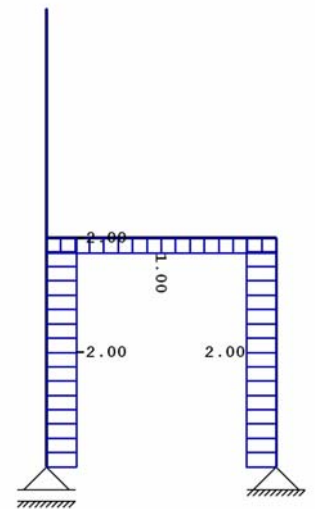
m1



t1



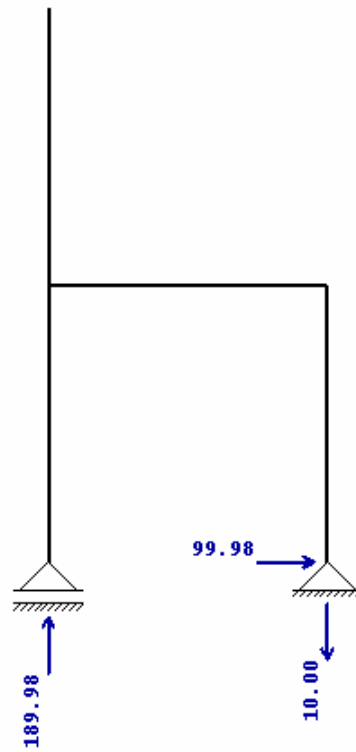
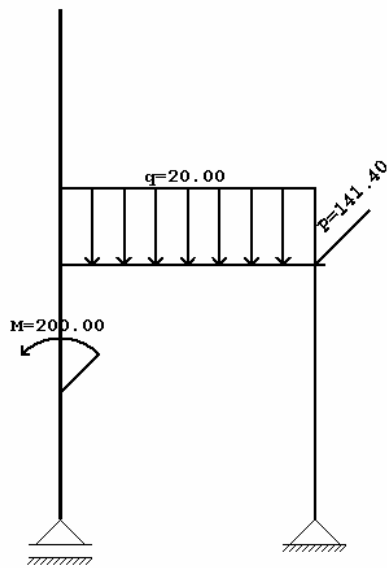
n1



$$a_{11} = 64/EI$$

VANJSKO OPTEREĆENJE

REAKCIJE

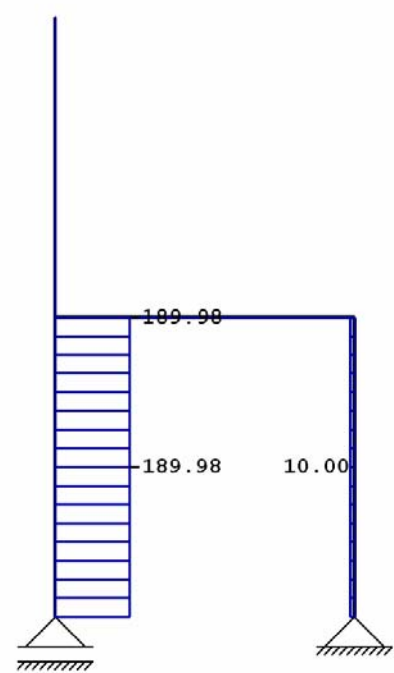
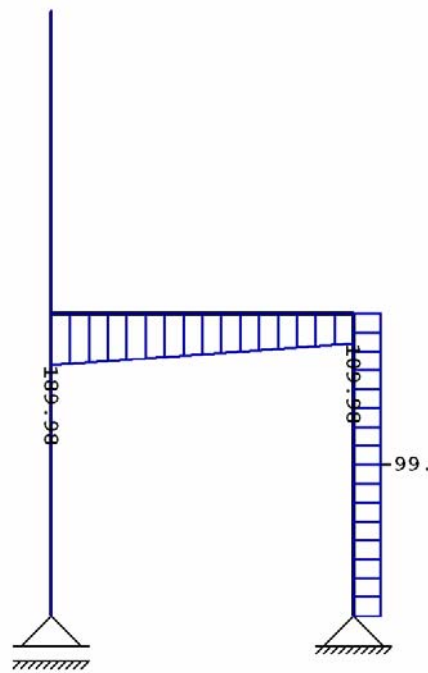
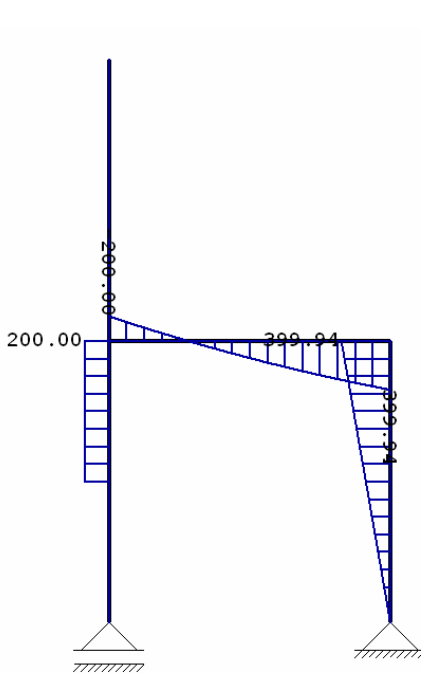


Dijagrami od vanjskog opterećenja

M_v

T_v

N_v

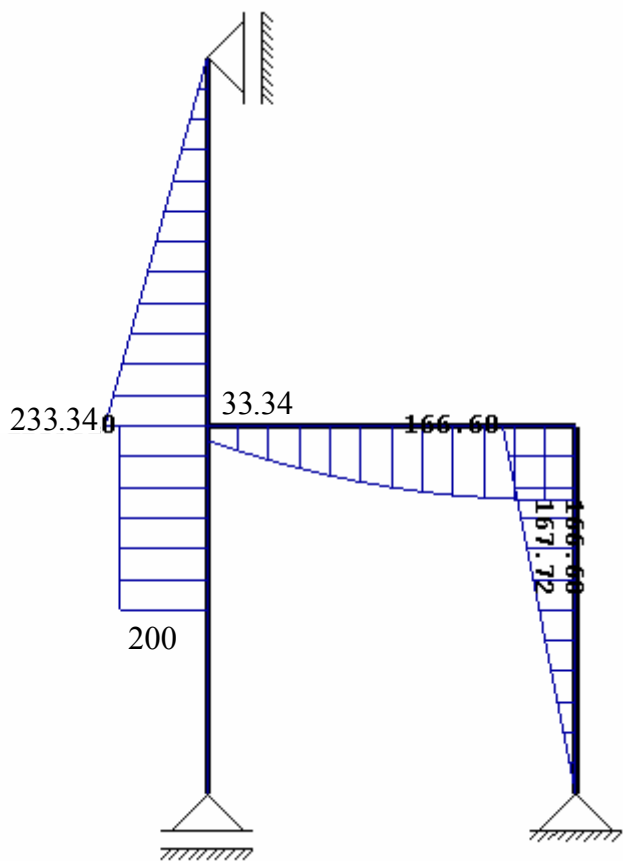


$$a_{1v} = 3733,33/EI$$

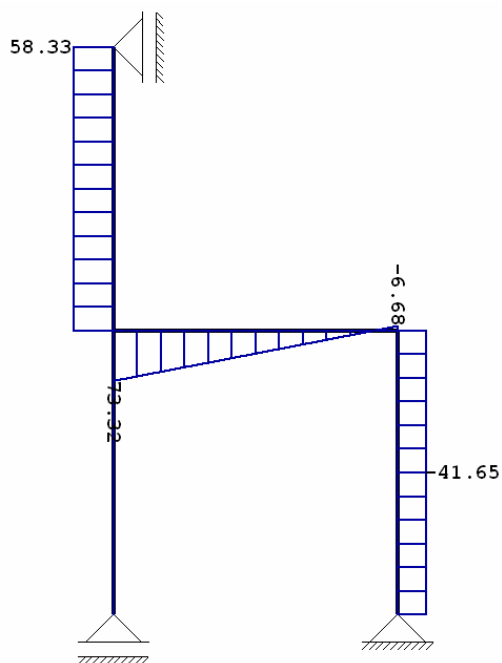
$$X_1 = -58,33 \text{ kN}$$

KONAČNI DIJAGRAM

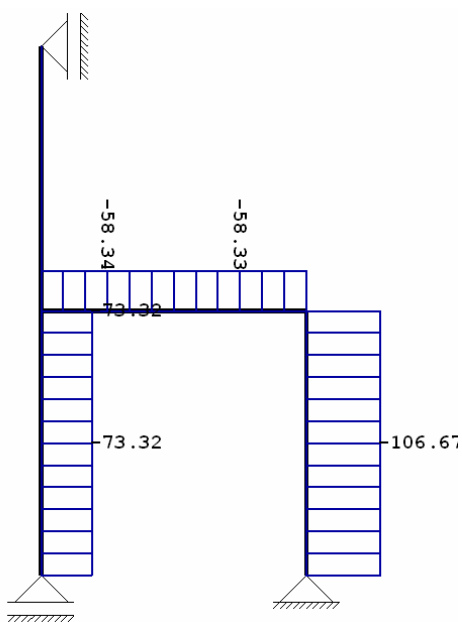
Mk



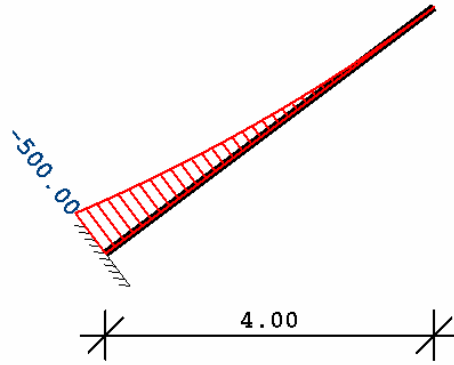
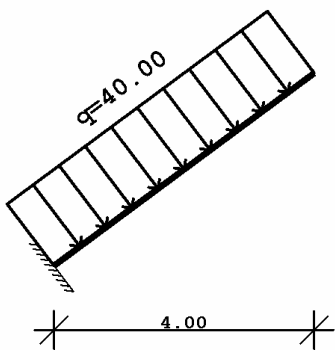
Tk



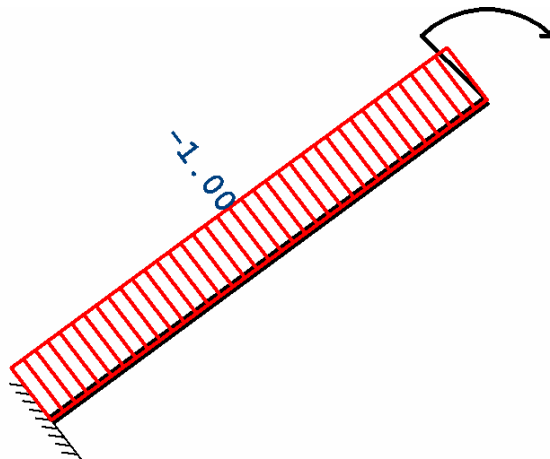
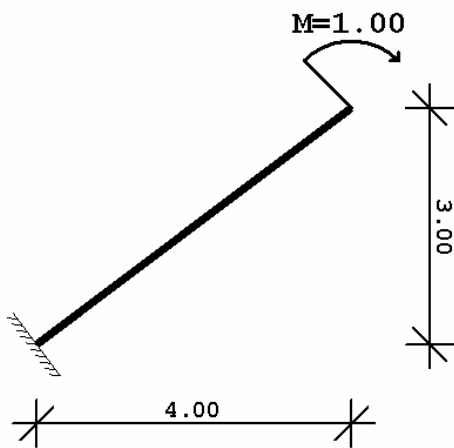
Nk



3. Odredite vrijednost kuta zaokreta točke A
 Dimenzije elemenata su 20/30 cm, $E = 3.15 \cdot 10^7 \text{ kN/m}^2$ (15 bodova)

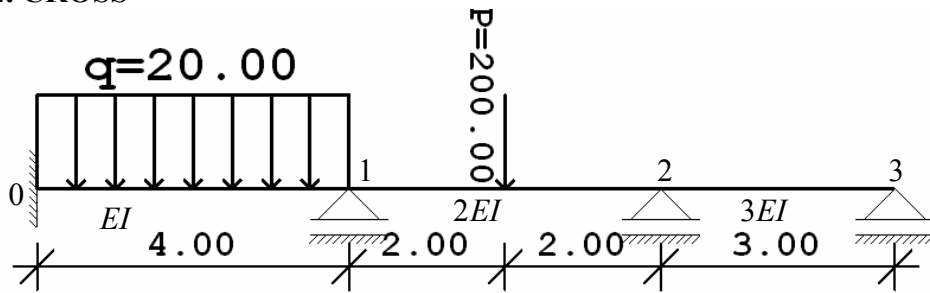


kut zaokreta



kut zaokreta točke A $\varphi_A = 0.05878 \text{ rad}$

4. CROSS-



$$a_{10} = 4k_{10} = 4 \cdot \frac{EI}{4} = EI$$

$$p_{10} = -\frac{EI}{3EI} = -\frac{1}{3}$$

$$a_{12} = 4k_{12} = 4 \cdot \frac{2EI}{4} = 2EI$$

$$\sum A_1 = 3EI$$

$$p_{12} = -\frac{2EI}{3EI} = -\frac{2}{3}$$

$$a_{21} = 4k_{21} = 4 \cdot \frac{2EI}{4} = 2EI$$

$$p_{21} = -\frac{2EI}{5EI} = -\frac{2}{5}$$

$$a_{23} = 3k_{23} = 3 \cdot \frac{3EI}{3} = 3EI$$

$$\sum A_2 = 5EI$$

$$p_{23} = -\frac{3EI}{5EI} = -\frac{3}{5}$$

$$\bar{M}_{01} = -\frac{ql^2}{12} = -\frac{20 \cdot 4^2}{12} = -26,67 \text{ kNm} \quad \bar{M}_{10} = \frac{ql^2}{12} = \frac{20 \cdot 4^2}{12} = 26,67 \text{ kNm}$$

$$\bar{M}_{12} = -\frac{Pl}{8} = -\frac{200 \cdot 4}{8} = -100 \text{ kNm} \quad \bar{M}_{21} = \frac{Pl}{8} = \frac{200 \cdot 4}{8} = 100 \text{ kNm}$$

