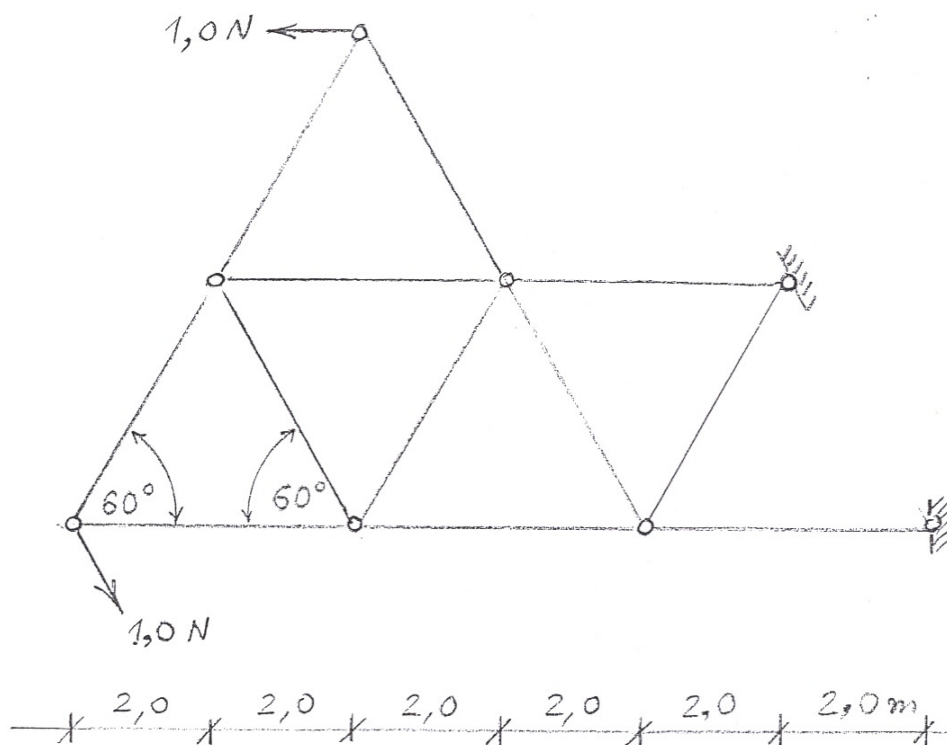


UVAŽIT ĆE SE SAMO RADOVI ČIJA PROVEDBA ODGOVARA PRISTUPU I NAČINU PRIKAZIVANJA KORIŠTENOM U DOSTUPNIM MATERIJALIMA S OVOG PREDMETA.

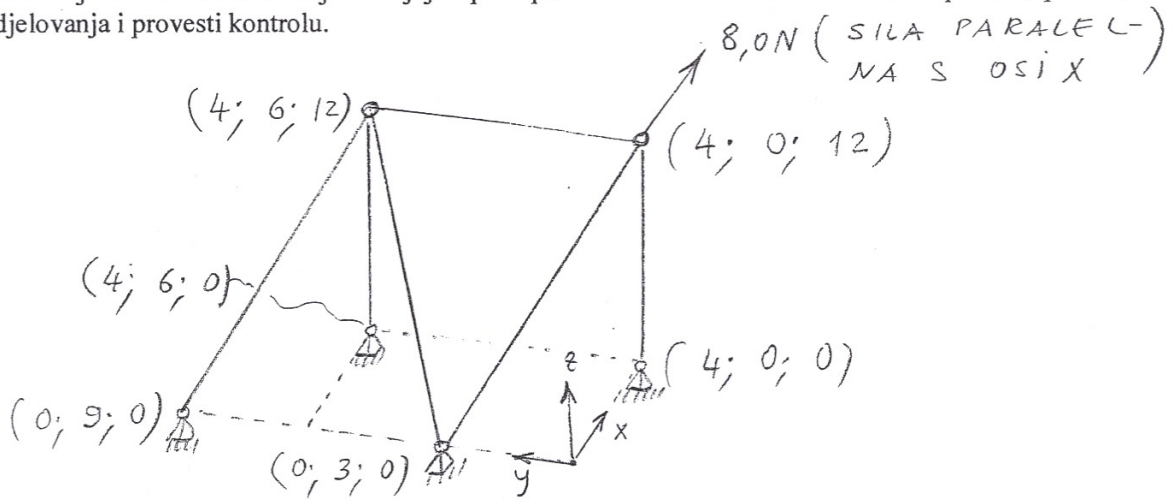
1. Kroz ishodište Kartezijevog sustava prolazi os  $u$  određena jediničnim vektorom  $\vec{e}_0(+0.64; -0.48; +0.60)$ . U točki  $1(4,0; 5,0; 6,0)$  nalazi se hvatište sile  $\vec{F}$ . Vektor sile je zadan  $\vec{F}(-12,0; -8,0; +9,0)$ . Treba odrediti  $M_u^F$  moment sile oko osi  $u$ . Za kontrolu treba odabrati novu točku s pravca djelovanja sile, novu točku na osi i s tim podacima zasebno izračunati moment oko osi. Svi međukoraci postupka moraju biti jasno i pregledno iskazani.

2. Prikazan ravninski sustav nalazi se u stanju ravnoteže. Sustav sadrži podlogu, 6 zglobnih čvorova i 12 zglobnih štapova. Rješenje treba započeti skiciranjem statičke sheme na kojoj se ne smiju dodavati informacije o daljnjim postupcima. Skica na samom zadatku može se koristiti za pomoćne operacije, ali ne i za statičke sheme. Ako se dio postupke nalazi na zadatku treba to istaknuti.

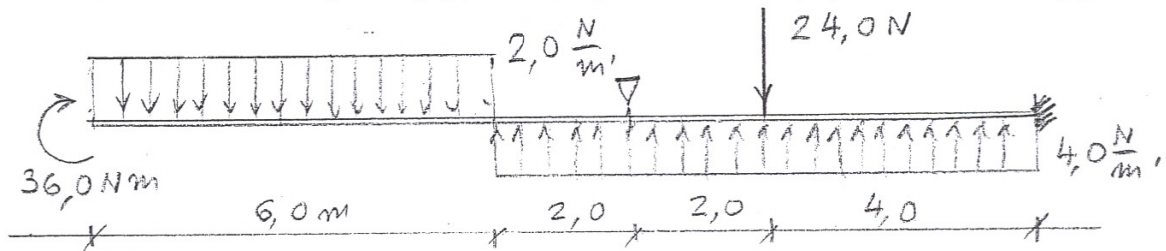
Treba odrediti sile u svim štapovima, prikazati stvarna djelovanja i provesti kontrolu. Uypđenje novih čvorova i novih sila se ne budu je.



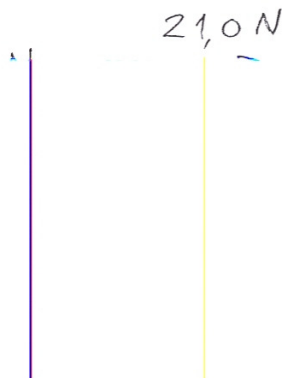
3. Aksonometrijski je prikazan prostorni sustav koji se nalazi se u stanju ravnoteže. Sustav sadži podlogu, 2 kulasto-zglobna čvora i 6 kuglasto-zglobnih štapova. Rješenje treba započeti skiciranjem statičke sheme na kojoj se ne smiju dodavati informacije o daljnjim postupcima. Treba odrediti sile u svim štapovima, prikazati stvarna djelovanja i provesti kontrolu.



4. Treba potpuno riješiti prikazani ravninski sustav. Treba prikazati stvarna djelovanja u spoju i označiti karakteristične presjeke. Za M u označenom presjeku treba detaljno prikazati postupak. Treba odrediti sve daljnje potrebne podatke i u mjerilu prikazati M dijagram. Parabole se smiju ucrtati slobodnom rukom, ali pripadne tangente trebaju biti ucrtane ravnalom uz precizno označenu ordinatu točke presjecanja za svaku parabolu. Pravce treba crtati ravnalom. (T i N dijagr, se ne traže). Priznat će se samo podaci uneseni na dijagram.



5. Treba potpuno riješiti uzdužno opterećenu konzolu. Koncentrirana sila od 21,0 N djeluje u točki 5. Treba prikazati stvarna djelovanja u spoju i označiti karakteristične presjeke. Za N u označenom presjeku treba detaljno prikazati postupak. Treba odrediti sve daljnje potrebne podatke i u mjerilu prikazati N dijagram. Parabole se smiju ucrtati slobodnom rukom, ali pripadne tangente trebaju biti ucrtane ravnalom uz precizno označenu ordinatu točke presjecanja za svaku parabolou. Pravce treba crtati ravnalom. (M, T dijagr, se ne traže). Priznat će se samo podaci uneseni na dijagram.



$$1). M_M^F = \vec{e}_0 \cdot (\vec{l} \times \vec{F}) = \begin{vmatrix} 0,64 & -0,48 & 0,60 \\ 4,0 & 5,0 & 6,0 \\ -12,0 & -8,0 & +9,0 \end{vmatrix} = 128,16 \quad \boxed{8}$$

ODABRANA TOČKA 2 NA OSI:  $(6,4; -4,8; +6,0)$   $\boxed{2}$

TOČKA 3 NA PRAVCU SILE:  $(4 - \frac{12}{2}; 5 - \frac{8}{2}; 6 + \frac{9}{2})$   $\boxed{2}$

TOČKA 3  $(-2,0; 1,0; 10,5)$

NOVI GEOMETRIJSKI VEKTOR  $\vec{l}_N = \vec{r}_3 - \vec{r}_2$

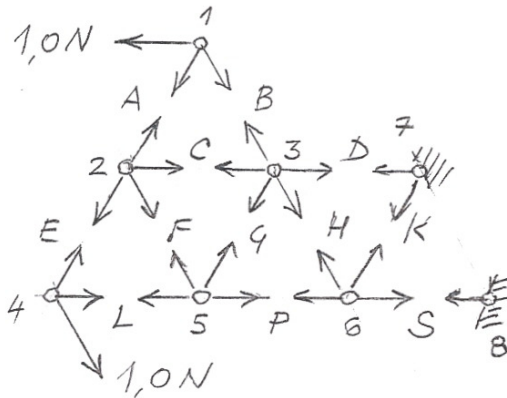
$\vec{l}_N (-8,4; +5,8; +4,5)$   $\boxed{2}$

MOMENT OKO OSI PREMA IZRAZU  $\vec{e}_0 \cdot (\vec{l}_N \times \vec{F})$

$$M_M^F = \begin{vmatrix} 0,64 & -0,48 & 0,60 \\ -8,4 & 5,8 & 4,5 \\ -12,0 & -8,0 & +9,0 \end{vmatrix} =$$

$$\begin{aligned} & 0,64 \cdot 5,8 \cdot 9,0 + (-0,48) \cdot 4,5 \cdot (-12,0) + 0,60 \cdot (-8,4) \cdot (-8,0) \\ & - (-12,0) \cdot 5,8 \cdot 0,60 - (-8,0) \cdot 4,5 \cdot 0,64 - 9 \cdot (-8,4) \cdot (-0,48) \\ & = 128,16 \checkmark \end{aligned} \quad \boxed{6}$$

2) STATIČKA SCHEMA [2]



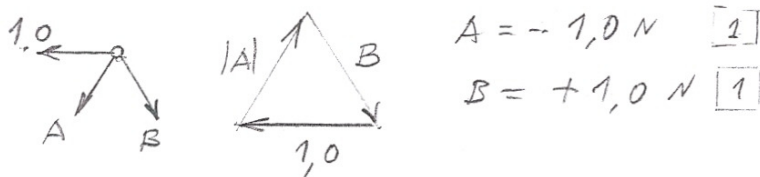
SUSTAV SE MOŽE  
RIJEŠITI ZASEBNIM  
PROMATRANJEM ČVOROVA  
MOGUĆ REDOSLIJED!

1, 4, 2, 5, 3, 6.

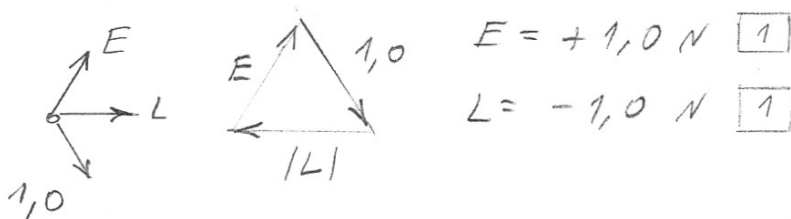
ZBOG JEDNOSTAVNOSTI  
GEOMETRIJSKIH

ODNOSA, NAJLAKŠE JE PROVESTI DIREKTAN POSTUPAK - POLIGONI SE SKICIRAJU, A ODNOSI VELIČINA ODREĐUJU PLANIMETRIJSKI.

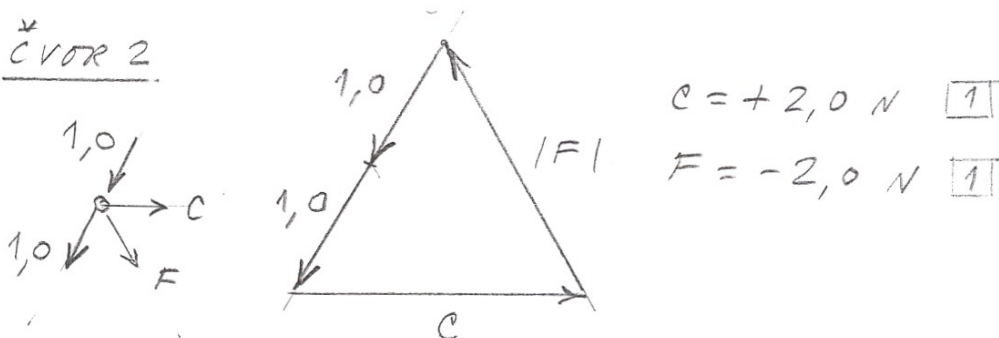
ČVOR 1



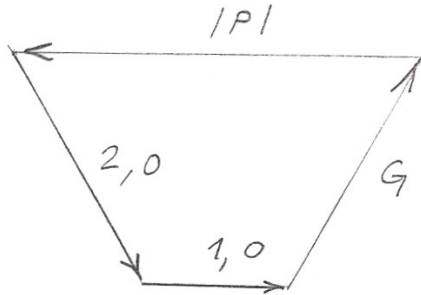
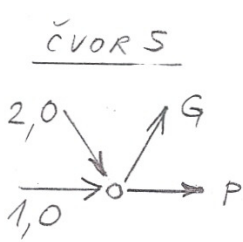
ČVOR 4



ČVOR 2

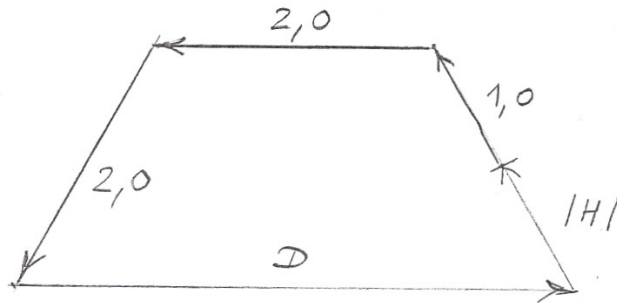
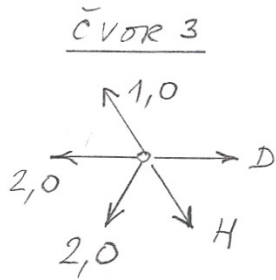


2) NASTAVAK



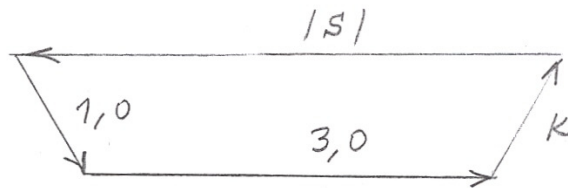
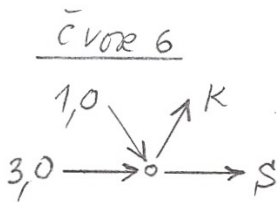
$$G = +2,0 \text{ N} \quad \boxed{1}$$

$$P = -3,0 \text{ N} \quad \boxed{1}$$



$$D = +4,0 \text{ N} \quad \boxed{1}$$

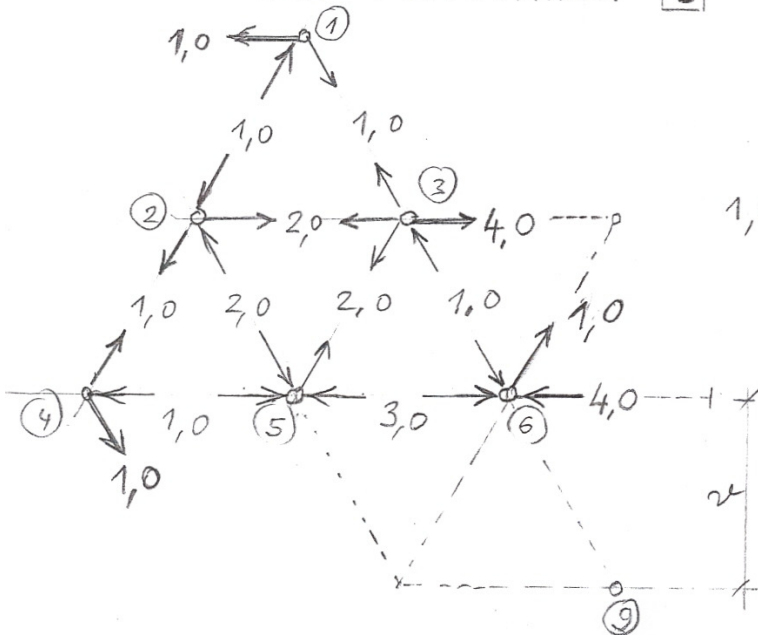
$$H = -1,0 \text{ N} \quad \boxed{1}$$



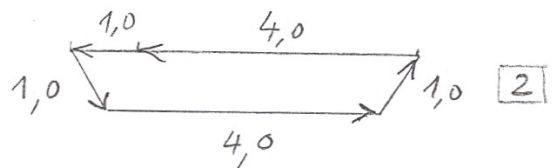
$$K = +1,0 \text{ N} \quad \boxed{1}$$

$$S = -4,0 \text{ N} \quad \boxed{1}$$

STVARNA DJELOVANJA 2



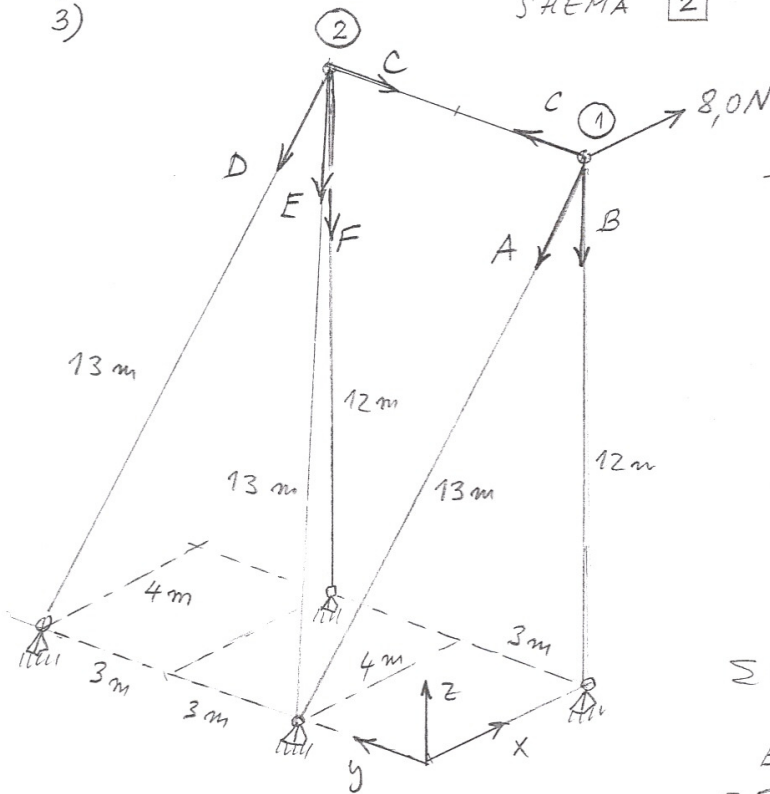
KONTROLA  
RAVNOTEŽA  
PODSISTAVA (1-6)



$$\begin{aligned} \sum M_g &= +3 \cdot v \cdot 1 - 2 \cdot v \cdot 4 \\ &+ 2 \cdot v \cdot 1 - v \cdot 1 + v \cdot 4 = \\ &= (+3 - 8 + 2 - 1 + 4) \cdot v \\ &= 0 \quad \boxed{2} \end{aligned}$$

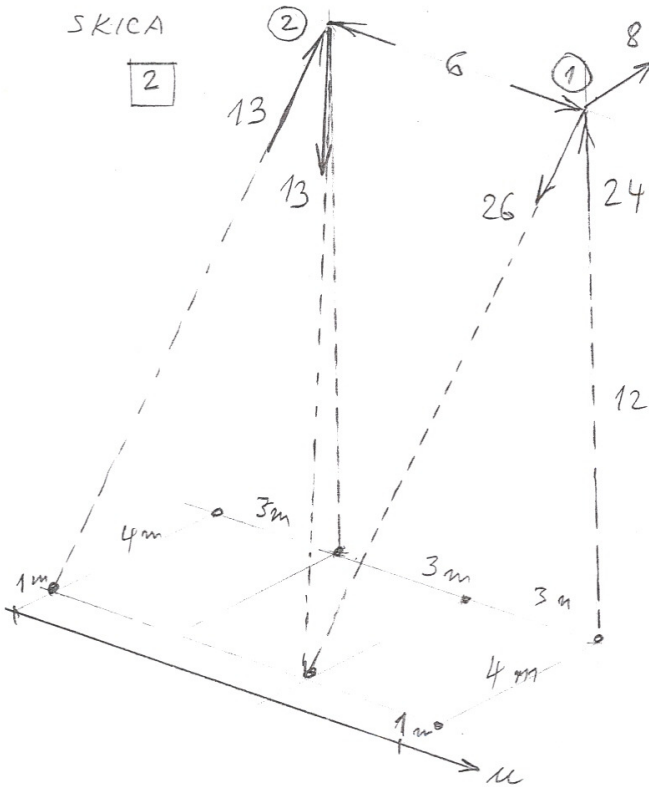
3)

HEMA 2



SKICA

2



ČVOR 1

$$\sum F_{xi} = \phi$$

$$-\frac{4}{13}A + 8 = \phi; \quad A = 26,0 \text{ N} \quad \boxed{2}$$

$$\sum F_{yi} = \phi$$

$$C + \frac{3}{13}A = \phi; \quad C = -6,0 \text{ N} \quad \boxed{2}$$

$$\sum F_z = \phi$$

$$-\frac{12}{13}A - B = \phi; \quad B = -24,0 \text{ N} \quad \boxed{2}$$

ČVOR 2

$$\sum F_{xi} = \phi; \quad -\frac{4}{13}D - \frac{4}{13}E = \phi$$

$$E = -D$$

$$\sum F_{yi} = \phi; \quad \frac{3}{13}D - \frac{3}{13}E - C = \phi$$

$$\frac{6}{13}D - (-6) = \phi; \quad D = -13,0 \text{ N} \quad \boxed{2}$$

$$E = +13,0 \text{ N} \quad \boxed{2}$$

$$\sum F_{zi} = \phi$$

$$-\frac{12}{13}D - \frac{12}{13}E - F = \phi; \quad F = 0,0 \text{ N} \quad \boxed{2}$$

KONTROLA

$$\sum M_u \text{ ZA PODSUSTAV (1,2)}$$

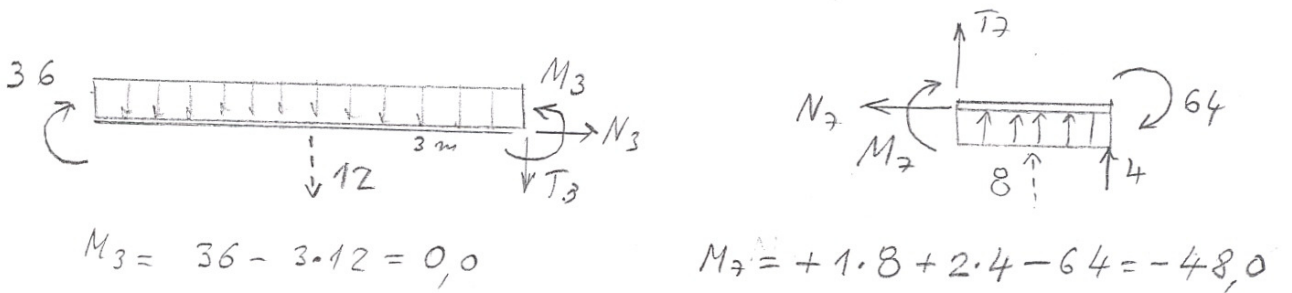
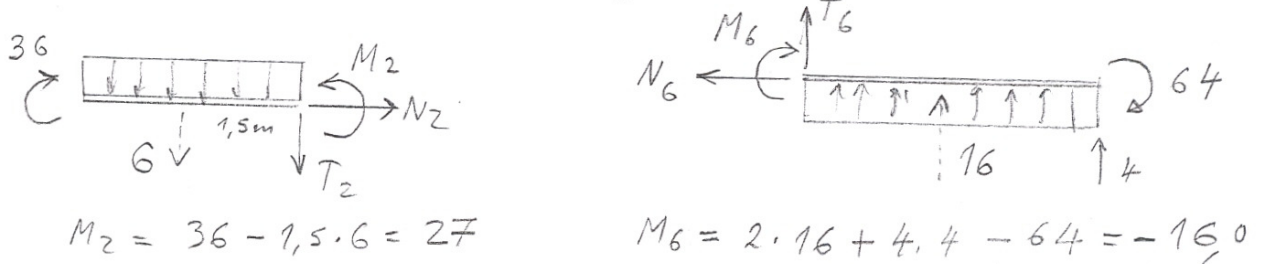
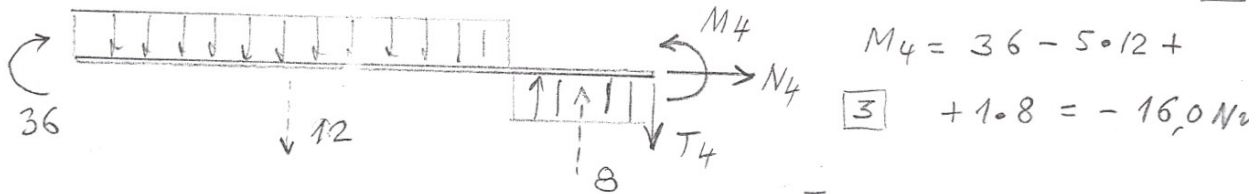
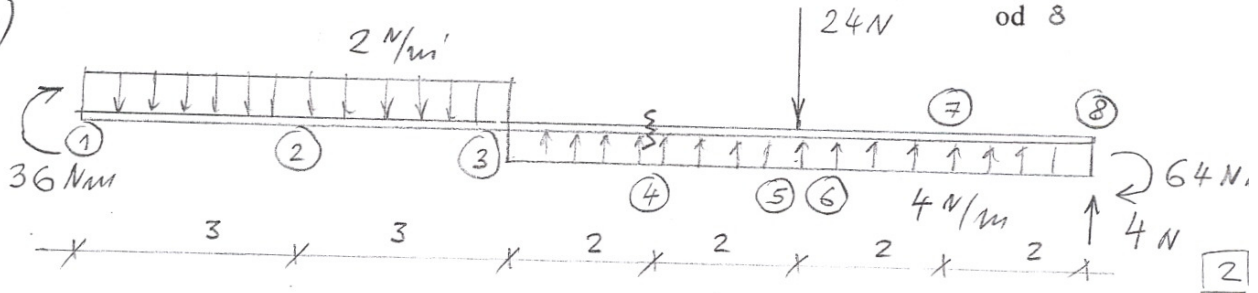
$$-12 \cdot 8 + 5 \cdot 24 + 1 \cdot A_z$$

$$+ 1 \cdot D_z + 1 \cdot E_z =$$

$$-12 \cdot 8 + 5 \cdot 24 + 1 \cdot (-24)$$

$$+ 1 \cdot 13 + 1 \cdot (-13) = \phi \quad \boxed{2}$$

4)

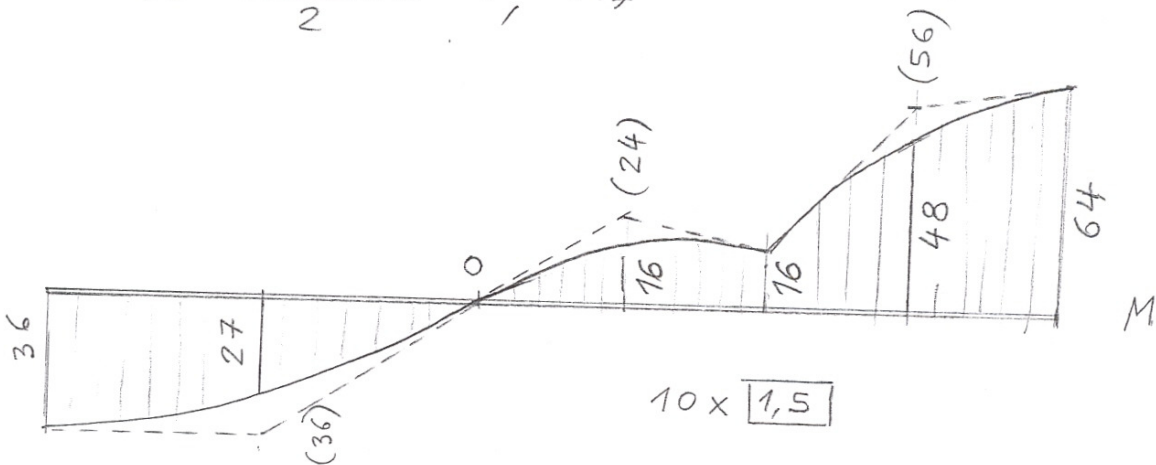


ORDINATE SJEČIŠTA TANGENTI

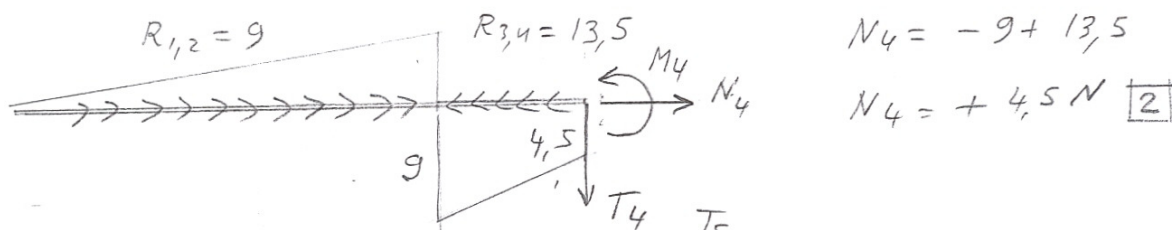
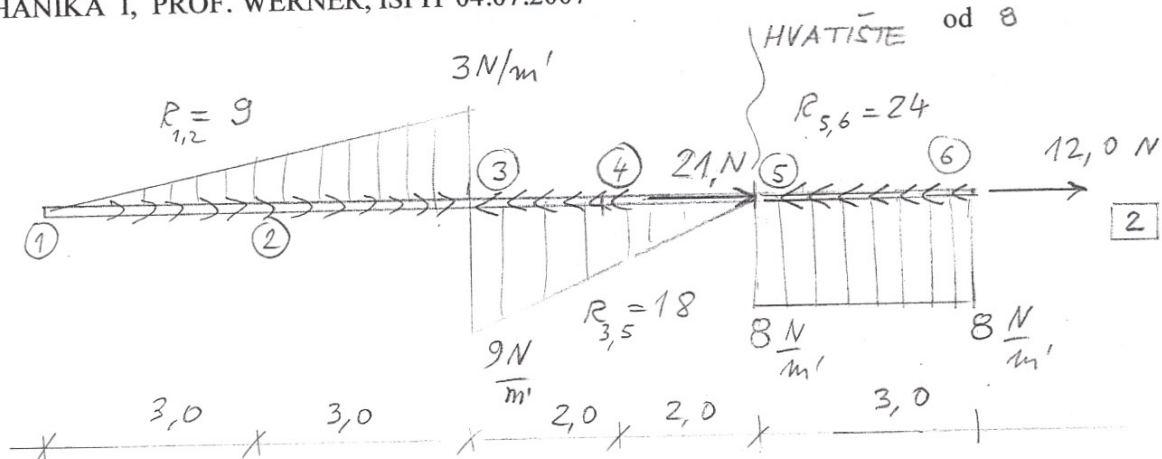
$$\Delta M_2 = 27 - \frac{36+0}{2} = 9; \bar{M}_2 = 27 + 9 = 36$$

$$\Delta M_4 = -16 - \frac{0-16}{2} = -8; \bar{M}_4 = -16 - 8 = -24$$

$$\Delta M_7 = -48 - \frac{-16-64}{2} = -8; \bar{M}_7 = -48 - 8 = -56$$

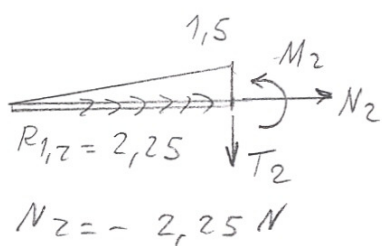


5)

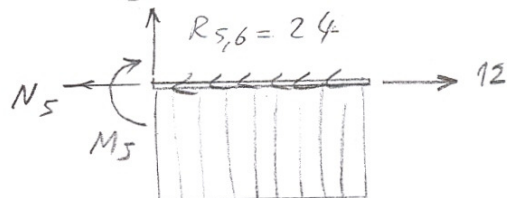


$$N_4 = -9 + 13,5$$

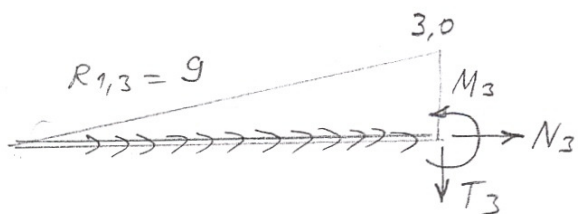
$$N_4 = +4,5 \text{ N} \quad \boxed{2}$$



$$N_2 = -2,25 \text{ N}$$



$$N_5 = -24 + 12 = -12,0 \text{ N}$$



$$N_3 = -9,0 \text{ N}$$

