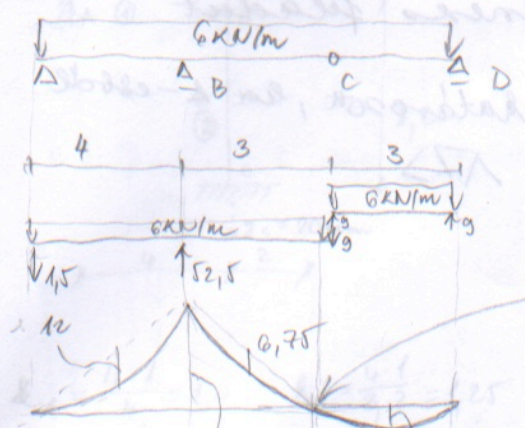


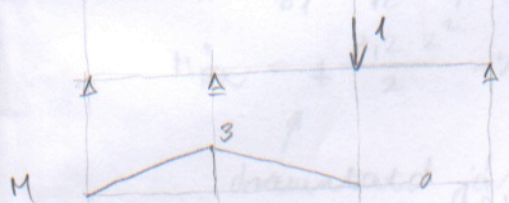
1) Adaltsa 8. a C pont figg. elme szuldsdt! ( $e_{cy} = ?$ )  
 rdzolja fel az aladvaltaszt!

$E = 210 \text{ kN/mm}^2$   
 $I = 2,14 \cdot 10^7 \text{ mm}^4$



itt nincs tereb!

attor erintd indugl a parabola, ha a szuszol rgehu uacs koncentrsdt tcher (tehdt ha most 0 lenne a tdmasserd) ha 1 mutat a tdmasserd hnu metrs dt, ha most 1 mutatna, dtmetrene



nrtintes veltet!

$$e_{cy} = \frac{10^9}{210 \cdot 2,14 \cdot 10^7} \left[ \frac{54,4}{2} \cdot \frac{2}{3} \cdot 3 - \frac{12 \cdot 4}{0} \cdot \frac{2}{2} \cdot \frac{3}{2} + \frac{54 \cdot 3}{2} \cdot \frac{2}{3} \cdot 3 - \frac{6,75 \cdot 3 \cdot 2}{3} \cdot \frac{3}{2} \right] =$$

$$= \frac{309,75 \cdot 10^9}{4,494 \cdot 10^9} = 68,9 \text{ mm} \downarrow$$

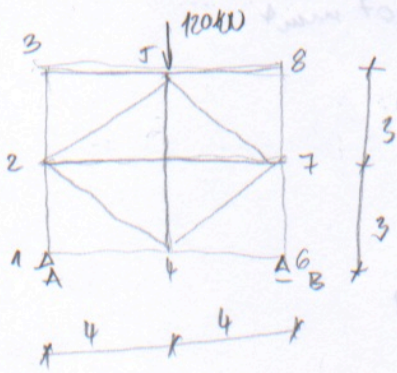
Most nem vrtintes az erintd, esdt sell Δ-bdl eb ∇-bdl szuszorabni (most nem eholnyes az 1/3-os szplet)



es nem ernddder! ltt meg llyesmitet nem sell szal nemi

(bndbzny)  $y = \frac{1}{24} \cdot \frac{q \cdot x^4}{EI}$

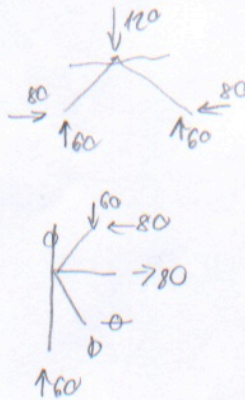
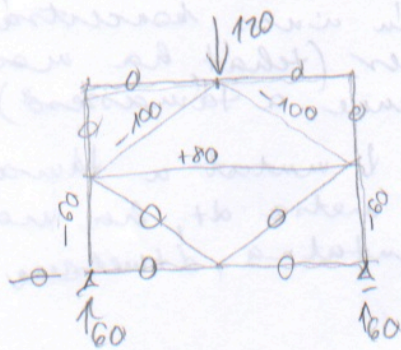
2 Számítsa ki a rudas tartó rudasit és adja meg egy  
 kb ábrán! ( $EA = del$ )



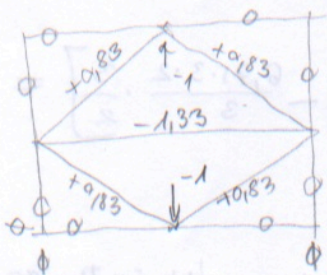
I/2-es feladat  $\rightarrow$  valdki'm', k es  
 egy esdudness feladat

rudas tartó határozott, ha  $\Delta$ -esbde  
 felepit'hetd'  $\nabla$

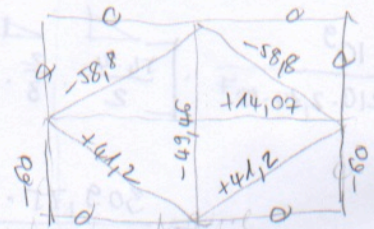
törmsatnd:



kiell most alul  
 szimmetria van, es'it  
 a felad seb2 is szim



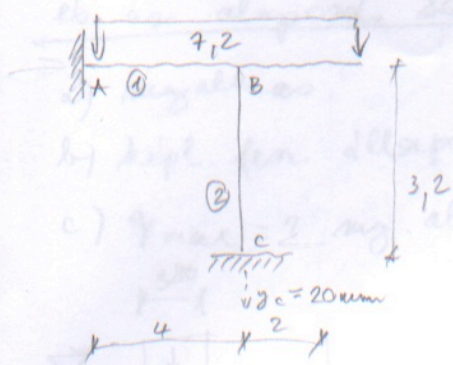
voelof:



mlad	ds	e	EA	$N_0$	$N_1$	$e_0$	$e_1$	$\chi \cdot N_1$	$N_V$
1-2; 6-7	2	3	del	-60	$\phi$	$\phi$	$\phi$	$\phi$	-60
2-5; 5-7	2	5		-100	+9,83	-833,3	6,94	+41,20	-58,8
2-4; 4-7	2	5		$\phi$	+9,83	$\phi$	6,94	+41,20	+41,2
2-7	1	8		+80	-1,33	-833,3	14,22	-65,93	+14,0
4-5	1	6		$\phi$	-1,0	$\phi$	6	-49,46	-49,4
						$\sum$	-1686,67	34,1	

$$x = \frac{-1686,67}{34,1} = 49,46 \text{ KN (nyomóerő)}$$

3. Rajzolja meg a síllyegek felmassái bent  $N, V, M$  ábráit!



$E = 210 \text{ kN/mm}^2$   
 $I = 2,14 \cdot 10^7 \text{ mm}^4$

elmaszults mddmre!  
 (indm dnmrel tll bonyolult!)

$k_1 = \frac{4 \cdot 1}{4} = 1,0$      $k_2 = \frac{4 \cdot 1}{3,2} = 1,25$

$\alpha_{B1} = 0,444$      $\alpha_{B2} = 0,556$

keszlet: befogás: nyomaték:

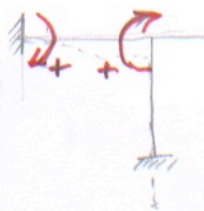
a) tcherbdl:

$M_A^0 = M_{B1}^0 = \frac{1}{12} \cdot 7,2 \cdot 4^2 = +9,6 \text{ kNm}$

$M_{B2}^0 = + \frac{7,2 \cdot 2^2}{2} = +14,4 \text{ kNm}$

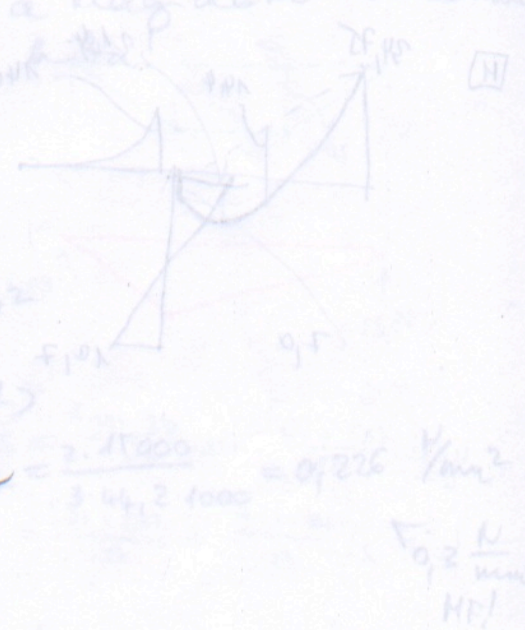
draumtatd jrsrdval  
 meggyesden fsrgat mast

b) td masssilyegek

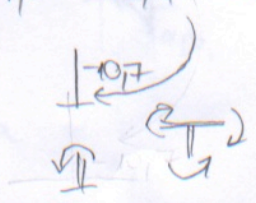


$M_1 = \frac{6 \cdot 4 \cdot 944 \cdot 10^3}{4000^2} = 1685 \text{ kN}$

$M_{A,B} = M_1 \cdot l = \frac{1685 \cdot 20}{1000} = +33,7 \text{ kNm}$



	0,444	0,556		
a)	+9,6	-9,6	+14,4	
b)	+33,7	+33,7		
	-8,55	-17,1	-21,4	
c)	+34,75	+7,0	-21,4	+14,4



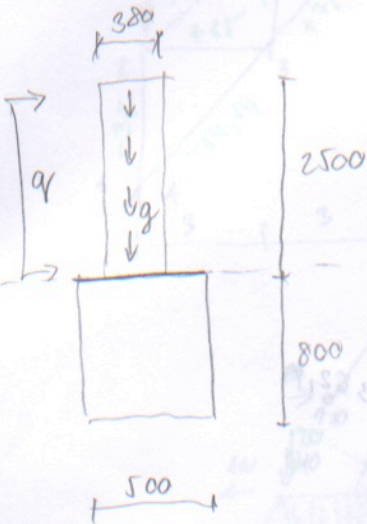
$2 \cdot 0,3 \cdot 1000 = 25000$   
 $c = \frac{2 \cdot N}{6 \cdot 5 \cdot l_d} = \frac{2 \cdot 15 \cdot 10^3}{3 \cdot 1000 \cdot 0,3} = 93,33 \text{ mm}$   
 $c = \frac{300}{2} - 93,33 = 106,67 \text{ mm}$



3. Ellendítse a téglát lentén 1m hosszú madarat a fal és az alapozás közötti keresztmetszeten.

- a) megadmas  
 b) képl. fen. állapotban!  
 c)  $q_{max} = ?$  mg. alapon

$q = 0,7 \text{ kN/m}$  ← ez a függőleges m.  
 $g = 6 \text{ kN/m}$  ←  
 $f_d = 0,3 \text{ N/mm}^2$



$$N = g \cdot 2,5 = 6 \cdot 2,5 = 15 \text{ kN}$$

$$M_{Ed} = \frac{0,7 \cdot 2,5^2}{2} = 2,1875 \text{ kNm}$$

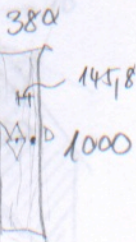
$$e = \frac{2,1875}{15} = 0,1458 \text{ m} = 145,8 \text{ mm}$$

tégla → kétszélű keresztmetszetre

ha csak képl. madaralás van, a maximális számítás eléri hibát!

← 145,8 mm →  $3,33 = \frac{380}{6}$   
 madaralás  
 sáv

$$k = \frac{1}{y \cdot A}$$



$$c = \frac{380}{2} - 145,8 = 44,2$$

$$N = \frac{3 \cdot c \cdot b}{2} \cdot f_d$$

$$\sigma = \frac{2 \cdot N}{3 \cdot c \cdot b} = \frac{2 \cdot 15000}{3 \cdot 44,2 \cdot 1000} = 0,226 \text{ N/mm}^2$$

$$\sigma = 0,3 \frac{\text{N}}{\text{mm}^2} \text{ MF!}$$

b)

$$N = 2 \cdot c \cdot b \cdot f_d = 2 \cdot 44,2 \cdot 2 \cdot 1000 \cdot 0,3 \cdot 10^{-3} = 26,52 \text{ kN}$$

$$V = 15 \text{ kN} \text{ MF!}$$

$$\frac{3 \cdot c \cdot 0,3 \cdot 1000}{2} = 15000$$

$$c = \frac{2 \cdot N}{3 \cdot f_d} = \frac{2 \cdot 15 \cdot 10^3}{3 \cdot 1000 \cdot 0,3} = 33,33 \text{ mm}$$

$$e = \frac{380}{2} - 33,33 = 156,67 \text{ mm}$$

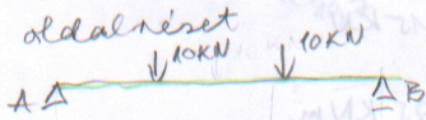
c) - határállapot, csak a legnagyobb fesz  $0,3 \frac{\text{N}}{\text{mm}^2}$   
 - a fesz. test térfogata megfigyeli N-el!

2

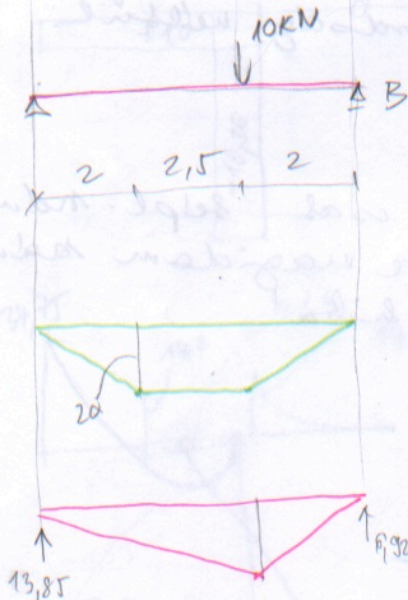
$$M = 0,1567 \cdot 15 = 2,35 \text{ KNm}$$

$$q_{\max} = \frac{2 \cdot 2,35}{2,5^2} = 0,752 \text{ KN/m}$$

2) Rajzolja meg a normál feszültségi eloszlást a legveszélyesebb keresztmetszeten!

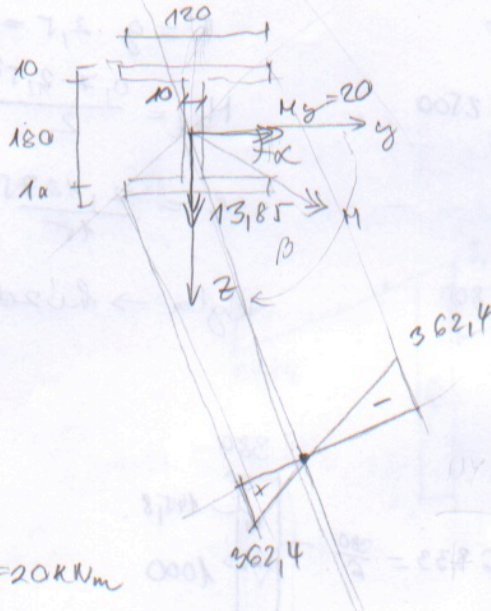


felülnézet



$$M_y = 20 \text{ KNm}$$

$$M_z = 13,85 \text{ KNm}$$



$$I_y = \frac{120 \cdot 200^3}{12} - 2 \cdot \frac{55 \cdot 180^3}{12} = 26,54 \cdot 10^6 \text{ mm}^4$$

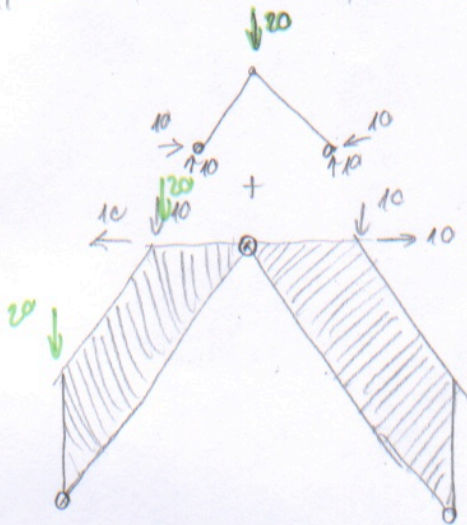
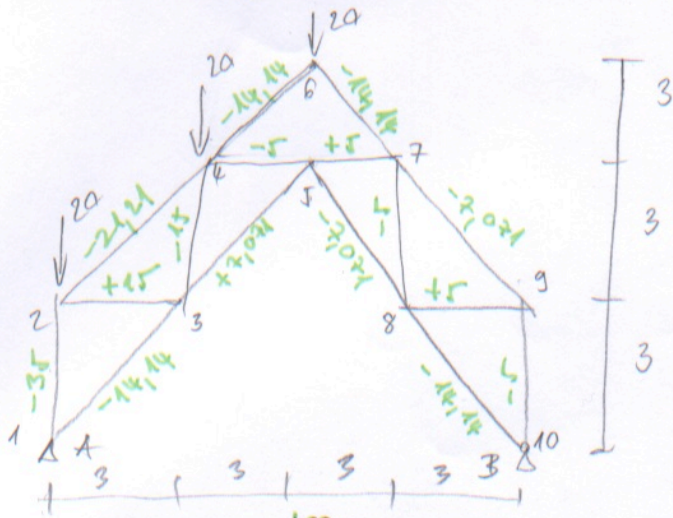
$$I_z = 2 \cdot \frac{10 \cdot 120^3}{12} + \frac{180 \cdot 10^3}{12} = 2,895 \cdot 10^6 \text{ mm}^4$$

$$\tan \beta = \tan \alpha \cdot \frac{I_y}{I_z} = \frac{M_z}{M_y} \cdot \frac{I_y}{I_z} = \frac{13,85}{20} \cdot \frac{26,54 \cdot 10^6}{2,895 \cdot 10^6} \Rightarrow \beta = 81,05^\circ$$

$$\sigma = \frac{M_y}{I_y} \cdot z + \frac{M_z}{I_z} \cdot y = \frac{20 \cdot 10^6}{26,54 \cdot 10^6} \cdot 100 + \frac{13,85 \cdot 10^6}{2,895 \cdot 10^6} \cdot 60 = 362,4 \text{ N/mm}^2$$

$$\frac{M_y}{I_y} \cdot z = \frac{M_z}{I_z} \cdot y$$

▣ Rendszeres meg a rdások tartó mdségit!



$$A_y = \frac{20 \cdot 12 + 30 \cdot 9 + 10 \cdot 3}{12} = 45 \text{ KN} \uparrow$$

$$B_y = \frac{30 \cdot 3 + 10 \cdot 9}{12} = 15 \text{ KN} \uparrow$$

$$B_x = \frac{15 \cdot 6 - 10 \cdot 3}{6} = 10 \text{ KN} \leftarrow$$

$$A_x = \frac{25 \cdot 6 - 30 \cdot 3}{6} = 10 \text{ KN} \rightarrow$$

