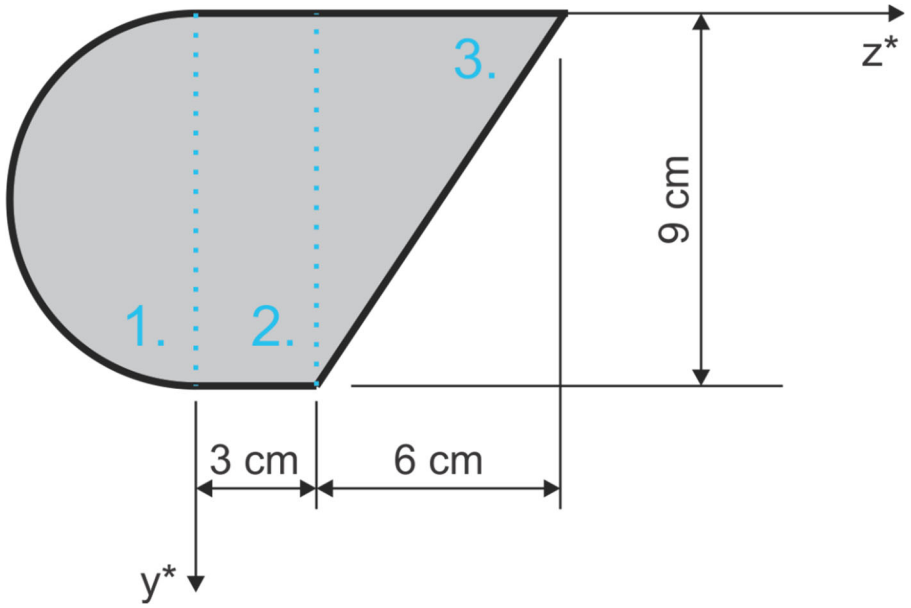
Dodatna naloga 2

Za prerez na spodnji sliki izračunajte težiščna vztrajnostna momenta (I_y, I_z), težiščni deviacijski moment (I_{yz}), glavna vztrajnostna momenta prereza in položaj glavnih vztrajnostnih osi.



Rezultati:

Lik (i)	y_{Ti} [cm]	z_{Ti} [cm]	A_i [cm^2]	I_{yi} [cm^4]	I_{zi} [cm^4]	I_{yizi} [cm^4]
1	4,5	-1,91	31,81	45,01	161,03	0
2	4,5	1,5	27	20,25	182,25	0
3	3	5	27	54	121,5	-40,5

Lik (i)	$(z_{Ti} - z_T)^2 A_i$ [cm^4]	$(y_{Ti} - y_T)^2 A_i$ [cm^4]	$(z_{Ti} - z_T)(y_{Ti} - y_T) A_i$ [cm^4]
1	335,99	7,03	-48,59
2	0,69	5,96	2,03
3	361,68	28,64	-101,78

$y_T = 4{,}03\ \text{cm},\ \ z_T = 1{,}34\ \text{cm}$

$I_y = 817{,}62\ \text{cm}^4,\ \ I_z = 506{,}41\ \text{cm}^4,\ \ I_{yz} = -188{,}84\ \text{cm}^4$

$$I_{1,2} = \frac{I_y + I_z}{2} \pm \sqrt{\left(\frac{I_y - I_z}{2}\right)^2 + {I_{yz}}^2} = 662{,}015\ \text{cm}^4 \pm 244{,}69\ \text{cm}^4$$

$I_1 = 906{,}705\ \text{cm}^4,\ \ I_2 = 417{,}325\ \text{cm}^4$

$$\tan 2\alpha = \frac{2I_{yz}}{I_z - I_y} = 1{,}2136 \quad \Rightarrow \quad \alpha = 25{,}26° \ , \ \ \alpha = 115{,}26° \ , \ldots$$

$I_u(\varphi = 25{,}26°) = 906{,}75\ \text{cm}^4 = I_1 \quad \Rightarrow \quad \alpha_1 = 25{,}26° \ , \ \ \alpha_2 = 115{,}26°$