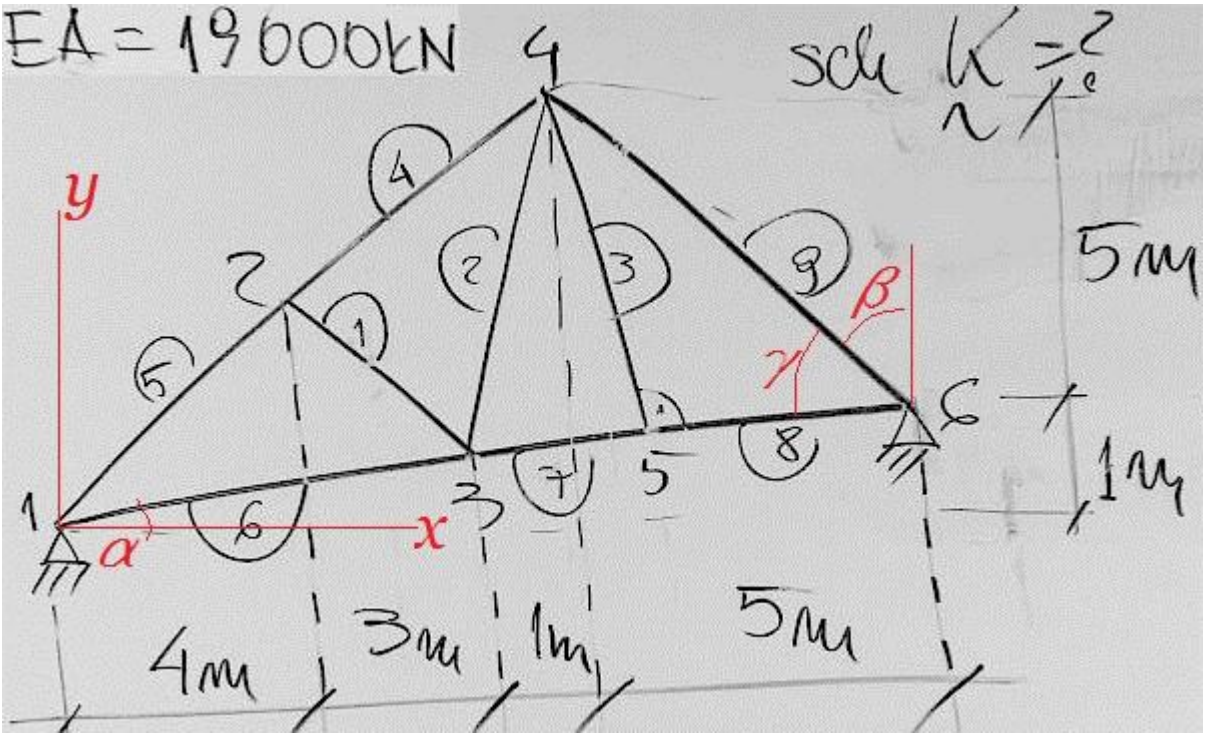
K1 - Macierze sztywności elementów kratownicy



elementy := (1 , 2 , 3 , 4) EA := 19MN *dokładnść ±0.5kN/m*

$\alpha := \operatorname{atan}\left(\frac{1}{13}\right) = 4.399 \cdot \mathrm{deg}$ $\beta := \operatorname{atan}\left(\frac{5}{5}\right) = 45 \cdot \mathrm{deg}$

$\gamma := \frac{\pi}{2} - \beta + \alpha = 49.39871 \cdot \mathrm{deg}$ $L9 := 5\mathrm{m} \cdot \sqrt{2} = 7.07107\,\mathrm{m}$

$L3 := L9 \cdot \sin(\gamma) = 5.36875\,\mathrm{m}$ $Y2 := 6\mathrm{m} \cdot \frac{4}{8} = 3\,\mathrm{m}$ $Y3 := 1\mathrm{m} \cdot \frac{7}{13} = 0.53846\,\mathrm{m}$

$X5 := 8\mathrm{m} + L3 \cdot \sin(\alpha) = 8.41176\,\mathrm{m}$ $Y5 := 1\mathrm{m} \cdot \frac{X5}{13\mathrm{m}} = 0.64706\,\mathrm{m}$

$\mathbf{K} =$

1	2	3	4	5	6	
J^5+J^6	$-J^5$	$-J^6$				1
	$J^1+J^4+J^5$	$-J^1$	$-J^4$			2
		$J^1+J^2+J^6+J^7$	$-J^2$	$-J^7$		3
			$J^2+J^3+J^4+J^9$	$-J^3$	$-J^9$	4
Symetria	Symetria	Symetria	Symetria	$J^3+J^7+J^8$	$-J^8$	5
					J^8+J^9	6

Element "1" - blok macierzy sztywności

$Lx := 3m = 3.00000\,m$ $\qquad$ $Ly := Y3 - Y2 = -2.46154\,m$

$L := \sqrt{(Lx)^2 + (Ly)^2} = 3.880615\,m$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (Lx)^2 & Lx \cdot Ly \\ Lx \cdot Ly & (Ly)^2 \end{bmatrix} \qquad J = \begin{bmatrix} 2926 & -2401 \\ (-2401) & 1970 \end{bmatrix} \frac{kN}{m}$$

Element "2" - blok macierzy sztywności

$Lx := 1m = 1\,m$ $\qquad$ $Ly := 6m - Y3 = 5.461538\,m$

$L := \sqrt{(Lx)^2 + (Ly)^2} = 5.552333\,m$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (Lx)^2 & Lx \cdot Ly \\ Lx \cdot Ly & (Ly)^2 \end{bmatrix} \qquad J = \begin{bmatrix} 111 & 606 \\ (606) & 3311 \end{bmatrix} \frac{kN}{m}$$

Element "3" - blok macierzy sztywności

$Lx := X5 - 8m = 0.411765\,m$ $\qquad$ $Ly := Y5 - 6m = -5.352941\,m$

$L := \sqrt{(Lx)^2 + (Ly)^2} = 5.368755\,m$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (Lx)^2 & Lx \cdot Ly \\ Lx \cdot Ly & (Ly)^2 \end{bmatrix} \qquad J = \begin{bmatrix} 21 & -271 \\ (-271) & 3518 \end{bmatrix} \frac{kN}{m}$$

Element "4" - blok macierzy sztywności

$Lx := 4m = 4\,m$ $\qquad$ $Ly := 6m - Y2 = 3.000000\,m$

$L := \sqrt{(Lx)^2 + (Ly)^2} = 5\,m$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (Lx)^2 & Lx \cdot Ly \\ Lx \cdot Ly & (Ly)^2 \end{bmatrix} \qquad J = \begin{bmatrix} 2432 & 1824 \\ (1824) & 1368 \end{bmatrix} \frac{kN}{m}$$