$ORIGIN := 1$

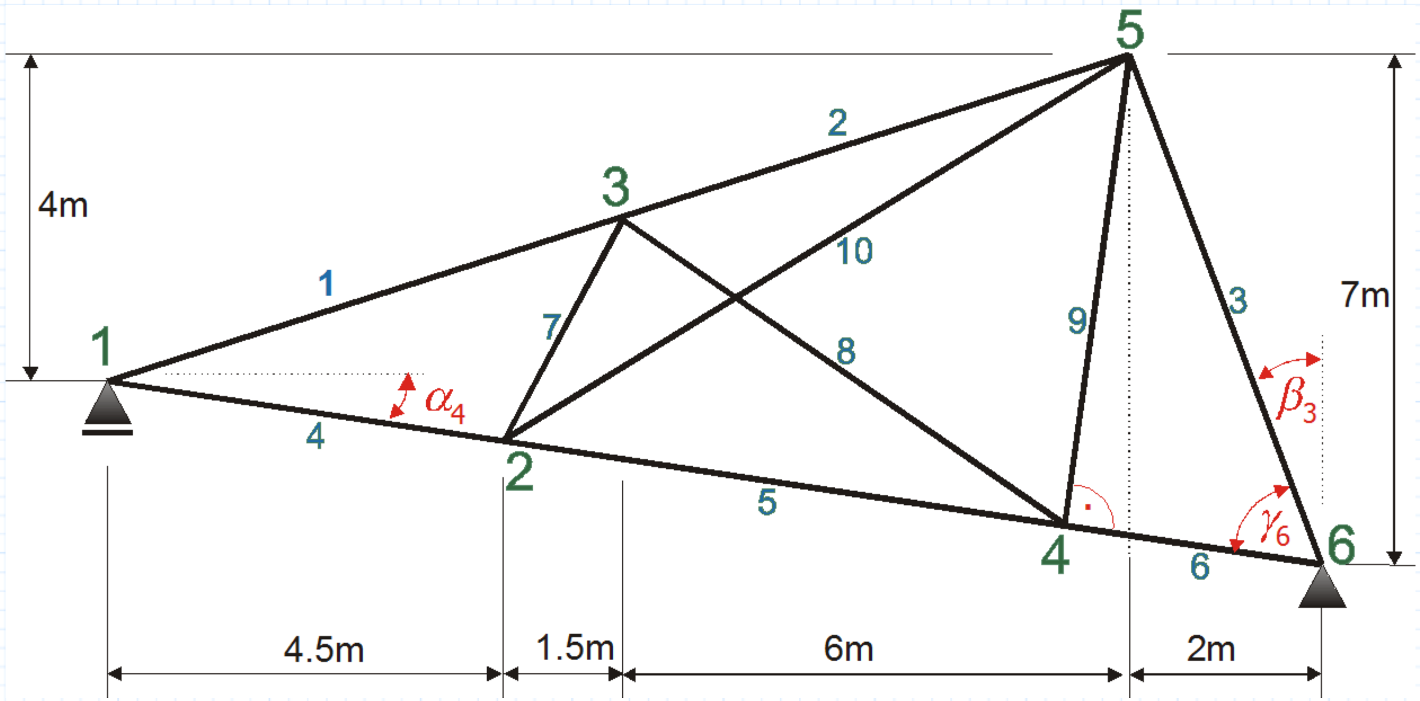
A6

$EA := 26\ MN$ **Elementy: 3, 7, 9, 10**

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

$J(Lx, Ly) := \frac{EA}{L(Lx, Ly)^3} \begin{bmatrix} Lx^2 & Lx \cdot Ly \\ Lx \cdot Ly & Ly^2 \end{bmatrix}$

*Wyznaczyć bloki **J** macierzy sztywności elementów kratownicy płaskiej.*
Składowe macierzy podać z dokładnością do +/- 0.05 kN/m



$\alpha 4 := \operatorname{atan}\left(\frac{3}{14}\right) = 12.0947571\ deg$

$\beta 3 := \operatorname{atan}\left(\frac{2}{7}\right) = 15.9453959\ deg$

$\gamma 6 := \frac{\pi}{2} - (\alpha 4 + \beta 3) = 61.959847\ deg$

$l3 := \sqrt{2^2 + 7^2}\ m = 7.2801099\ m$

$l9 := l3 \cdot \sin(\gamma 6) = 6.4255587\ m$

$Y3 := 2\ m$ $Y2 := -3\ m \cdot \frac{4.5}{14}$ $Y4 := 6\ m \cdot \frac{6.5}{16}$

Element "3"

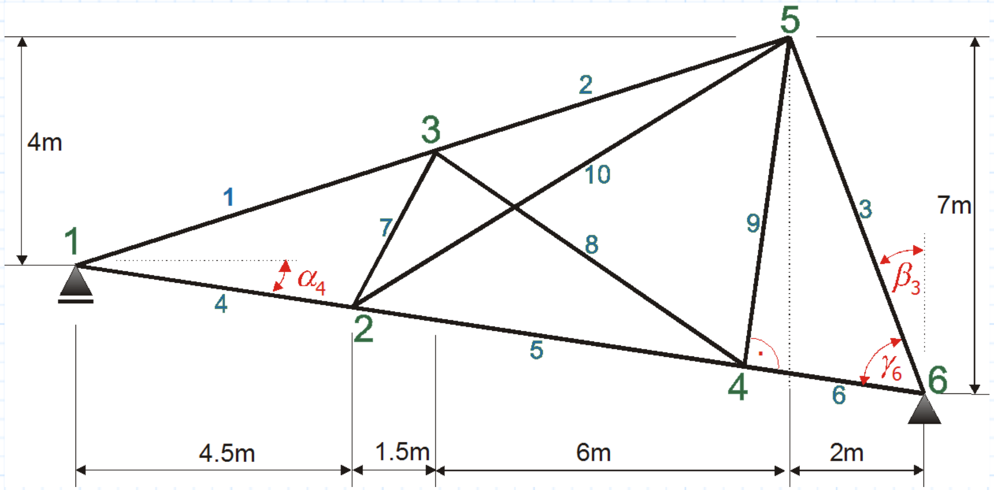
$Lx := 2\ m = 2\ m$ $Ly := -7\ m = -7.00000\ m$ $L := \sqrt{(Lx)^2 + (Ly)^2} = 7.2801099\ m$

$$J^3 = \begin{bmatrix} 269.5 & -943.4 \\ -943.4 & 3301.8 \end{bmatrix} \frac{kN}{m}$$

Element "7"

$Lx := 1.5\ m = 1.5\ m$ $Ly := Y3 - Y2 = 2.964286\ m$ $L := \sqrt{(Lx)^2 + (Ly)^2} = 3.322197\ m$

$$J^7 = \begin{bmatrix} 1595.4 & 3152.9 \\ 3152.9 & 6230.7 \end{bmatrix} \frac{kN}{m}$$



Element "9"

$Lx := l9 \cdot \sin(\alpha 4) = 1.346341\ m$ $Ly := l9 \cdot \cos(\alpha 4) = 6.282927\ m$ $L := \sqrt{(Lx)^2 + (Ly)^2} = 6.4255587\ m$

$$J^9 = \begin{bmatrix} 177.6 & 829.0 \\ 829.0 & 3868.7 \end{bmatrix} \frac{kN}{m}$$

Element "10"

$Lx := 7.5\ m = 7.5\ m$

$Ly := 4\ m - Y2 = 4.964286\ m$

$L := \sqrt{(Lx)^2 + (Ly)^2} = 8.994117\ m$

$$J^{10} = \begin{bmatrix} 2010.1 & 1330.5 \\ 1330.5 & 880.7 \end{bmatrix} \frac{kN}{m}$$