

#1: [CaseMode := Sensitive, InputMode := Word]

#2: [X1 :=, Y1 :=, Z1 :=, Y2 :=, Z2 :=, Z3 :=]

Longitud de los elementos:

#3: $[L3 := \sqrt{2^2 + 3^2}, L4 := \sqrt{1^2 + 1^2 + 4^2}, L4_{xy} := \sqrt{1^2 + 1^2}, L5 := \sqrt{1^2 + 1^2 + 4^2}, L6 := \sqrt{1^2 + 2^2 + 4^2}]$

#4: [L3 := 3.605551275, L4 := 4.242640687, L4_{xy} := 1.414213562, L5 := 4.242640687, L6 := 4.582575694]

#5: [L3 := $\sqrt{13}$, L4 := $3\cdot\sqrt{2}$, L4_{xy} := $\sqrt{2}$, L5 := $3\cdot\sqrt{2}$, L6 := $\sqrt{21}$]

Ecuaciones de equilibrio con las fuerzas externas:

$\Sigma F=0$ y ΣM respecto al nudo 1=0

$$\#6: \left[\begin{array}{l} X1 + 10 + 5 \cdot L4 \cdot \frac{1}{L4} = 0 \\ Y1 + Y2 + 5 \cdot L4 \cdot \frac{1}{L4} = 0 \\ Z1 + Z2 + Z3 + 5 \cdot L4 \cdot \frac{4}{L4} = 0 \\ Z3 \cdot 3 = 0 \\ -Z2 \cdot 2 - Z3 \cdot 2 + 10 \cdot 4 = 0 \\ Y2 \cdot 2 - 10 \cdot 1 = 0 \end{array} \right]$$

$$\#7: [X1 = -15 \wedge Y1 = -10 \wedge Y2 = 5 \wedge Z1 = -40 \wedge Z3 = 0 \wedge Z2 = 20]$$

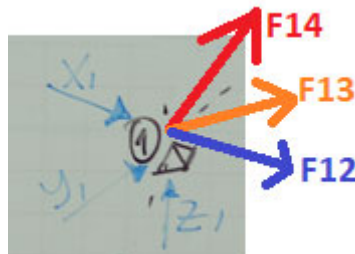
$$\#8: [X1 := -15, Y1 := -10, Y2 := 5, Z1 := -40, Z2 := 20, Z3 := 0]$$

Fuerzas internas:

$$\#9: [F12 :=, F21 :=, F23 :=, F32 :=, F13 :=, F31 :=, F14 :=, F41 :=, F24 :=, \\ F42 :=, F32 :=, F43 :=]$$

$\sum F=0$ en el nudo 1:

$$\#10: [F12 :=, F13 :=, F14 :=]$$



$$\#11: \left[\begin{array}{l} X1 + F12 + F13 \cdot \frac{2}{L3} + F14 \cdot \frac{1}{L4} = 0 \\ Y1 + F13 \cdot \frac{3}{L3} + F14 \cdot \frac{1}{L4} = 0 \\ Z1 + F14 \cdot \frac{4}{L4} = 0 \end{array} \right]$$

$$\#12: [F12 = 5 \wedge F13 = 0 \wedge F14 = 42.42640687]$$

$$\#13: [F12 := 5, F13 := 0, F14 := 30 \cdot \sqrt{2}]$$

$\sum F=0$ en el nudo 2:

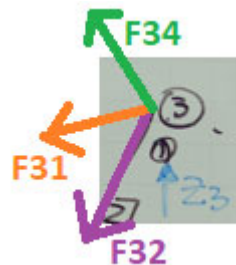
#14: [F21 :=, F24 :=, F23 :=]



$$\#15: \begin{bmatrix} -F21 - F24 \cdot \frac{1}{L5} = 0 \\ Y2 + F23 + F24 \cdot \frac{1}{L5} = 0 \\ Z2 + F24 \cdot \frac{4}{L5} = 0 \end{bmatrix}$$

#16: [F21 = 5 \wedge F23 = 0 \wedge F24 = -21.21320343]#17: [F21 = 5 \wedge F23 = 0 \wedge F24 = -15 $\cdot\sqrt{2}$] $\Sigma F=0$ en el nudo 3:

#18: [F32 :=, F31 :=, F34 :=]

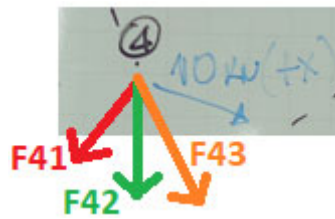


$$\#19: \begin{bmatrix} -F31 \cdot \frac{2}{L3} - F34 \cdot \frac{1}{L6} = 0 \\ -F32 - F31 \cdot \frac{3}{L3} - F34 \cdot \frac{2}{L6} = 0 \\ Z3 + F34 \cdot \frac{4}{L6} = 0 \end{bmatrix}$$

#20: [F31 := 0, F32 := 0, F34 := 0]

 $\Sigma F=0$ en el nudo 4:

#21: [F41 :=, F42 :=, F43 :=]



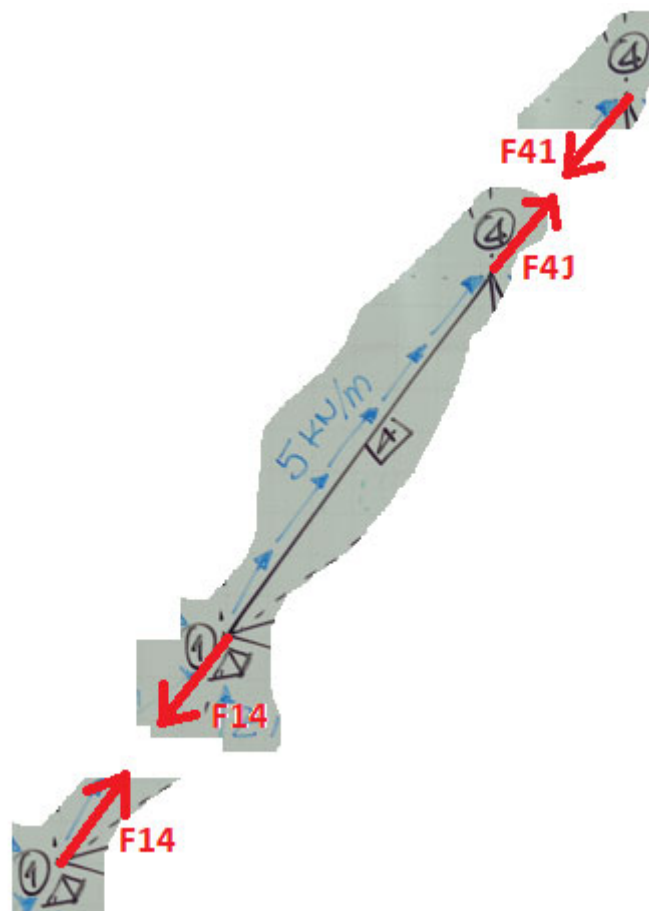
#22:

$$\begin{bmatrix} 10 - F41 \cdot \frac{1}{L4} + F42 \cdot \frac{1}{L5} + F43 \cdot \frac{1}{L6} = 0 \\ - F41 \cdot \frac{1}{L4} - F42 \cdot \frac{1}{L5} + F43 \cdot \frac{2}{L6} = 0 \\ - F41 \cdot \frac{4}{L4} - F42 \cdot \frac{4}{L5} - F43 \cdot \frac{4}{L6} = 0 \end{bmatrix}$$

#23: [F41 = 21.21320343 ∧ F42 = -21.21320343 ∧ F43 = 0]

#24: [F41 := 15·√2, F42 := - 15·√2, F43 := 0]

ΣF=0 en el elemento 4 para chequeo:



$$\#25: -F_{14} + 5 \cdot L_4 + F_{41} = 0$$

$$\#26: -30 \cdot \sqrt{2} + 5 \cdot (3 \cdot \sqrt{2}) + 15 \cdot \sqrt{2} = 0$$

$$\#27: 0 = 0$$