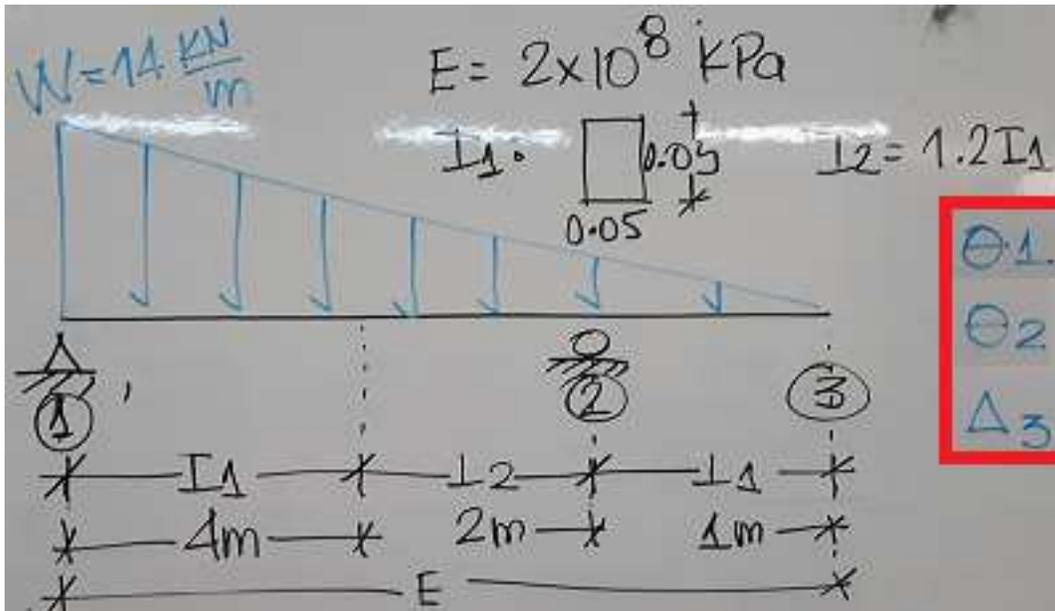


Encontrar los valores de las reacciones de fuerza y momento de la estructura de la siguiente figura:



[CaseMode := Sensitive, InputMode := Word, DisplayFormat := Normal]

[W :=, E :=, I1 :=, I2 :=]

[y1 :=, y2 :=]

$$\left[ \begin{array}{l} W := 14, E := 2 \cdot 10^8, I1 := \frac{0.05^4}{12}, I2 := 1.2 \cdot I1 \end{array} \right]$$

Ecuaciones del equilibrio estático:

$$\left[ \begin{array}{l} y1 + y2 = \frac{W \cdot 7}{2} \\ y2 \cdot 6 - \frac{W \cdot 7}{2} \cdot \left( \frac{1}{3} \cdot 7 \right) = 0 \end{array} \right]$$

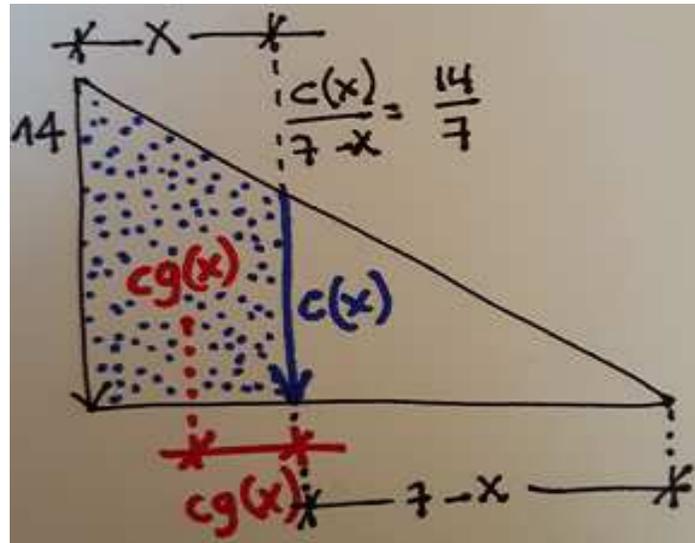
$$\left[ \begin{array}{l} y1 + y2 = 49 \\ y2 = \frac{343}{18} \end{array} \right]$$

$$\left[ y1 := \frac{539}{18}, y2 := \frac{343}{18} \right]$$

[y1 = 29.94444444 ^ y2 = 19.05555555]

Determinación de las ecuaciones de momento flector:

[MF1(x) :=, MF2(x) :=, c(x) :=]



$$\left[ c(x) := \frac{14}{7} \cdot (7 - x), \quad cg(x) := \frac{x \cdot (2 \cdot 14 + c(x))}{3 \cdot (14 + c(x))} \right]$$

$$\left[ c(x) := 2 \cdot (7 - x), \quad cg(x) := \frac{x \cdot (x - 21)}{3 \cdot (x - 14)} \right]$$

$$\left[ \begin{aligned} MF1(x) &:= y1 \cdot x - \frac{14 + c(x)}{2} \cdot x \cdot cg(x) \\ MF2(x) &:= y1 \cdot x - \frac{14 + c(x)}{2} \cdot x \cdot cg(x) + y2 \cdot (x - 6) \end{aligned} \right]$$

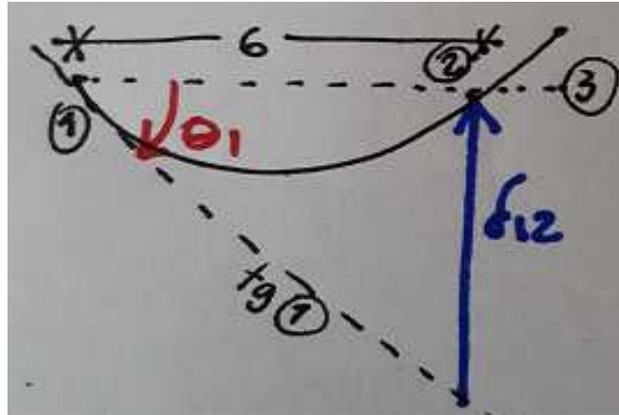
$$\left[ \begin{aligned} MF1(x) &:= \frac{x^3}{3} - 7 \cdot x^2 + \frac{539 \cdot x}{18} \\ MF2(x) &:= \frac{x^3}{3} - 7 \cdot x^2 + 49 \cdot x - \frac{343}{3} \end{aligned} \right]$$

$$\left[ \begin{aligned} MF1(x) &:= 0.3333333333 \cdot x^3 - 7 \cdot x^2 + 29.94444444 \cdot x \\ MF2(x) &:= 0.3333333333 \cdot x^3 - 7 \cdot x^2 + 49 \cdot x - 114.3333333 \end{aligned} \right]$$

Uso del método del Diagrama de Momento Flector:

-Distancia entre la proyección de la tangente en el apoyo 1 a la curva elástica en el punto del apoyo 2:

-Ángulo de giro del apoyo 1:



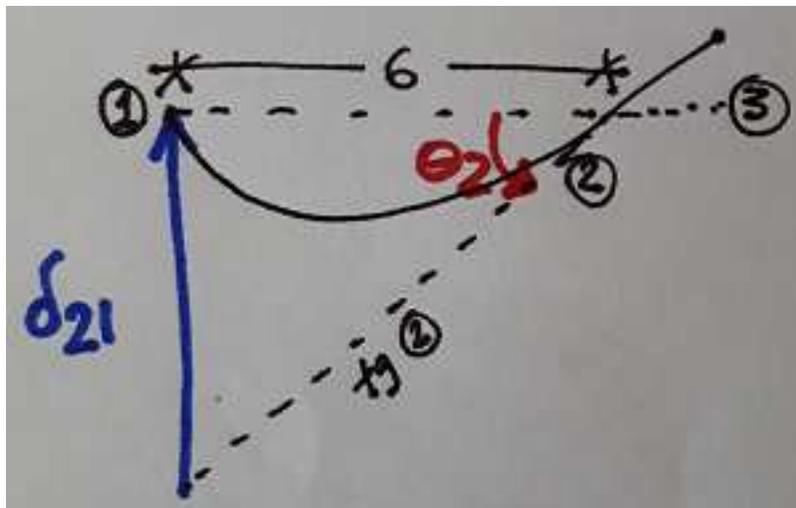
$$\left[ \begin{array}{l} d_{12} := \frac{1}{E \cdot I_1} \cdot \int_0^4 MF_1(x) \cdot (6 - x) \, dx + \frac{1}{E \cdot I_2} \cdot \int_4^6 MF_1(x) \cdot (6 - x) \, dx \\ \theta_1 := - \frac{d_{12}}{6} \end{array} \right]$$

$$\left[ \begin{array}{l} d_{12} := \frac{360214}{84375} \\ \theta_1 := - \frac{180107}{253125} \end{array} \right]$$

$$\left[ \begin{array}{l} d_{12} := 4.269202962 \\ \theta_1 := -0.7115338271 \end{array} \right]$$

-Distancia entre la proyección de la tangente en el apoyo 2 a la curva elástica en el punto del apoyo 1:

-Ángulo de giro del apoyo 2:



$$\left[ \begin{array}{l} d_{21} := \frac{1}{E \cdot I_1} \cdot \int_0^4 MF1(x) \cdot (0 - x) \, dx + \frac{1}{E \cdot I_2} \cdot \int_4^6 MF1(x) \cdot (0 - x) \, dx \\ \theta_2 := \frac{d_{21}}{6} \end{array} \right]$$

$$\left[ \begin{array}{l} d_{21} := \frac{309296}{84375} \\ \theta_2 := \frac{154648}{253125} \end{array} \right]$$

$$\left[ \begin{array}{l} d_{21} := 3.66573037 \\ \theta_2 := 0.6109550617 \end{array} \right]$$

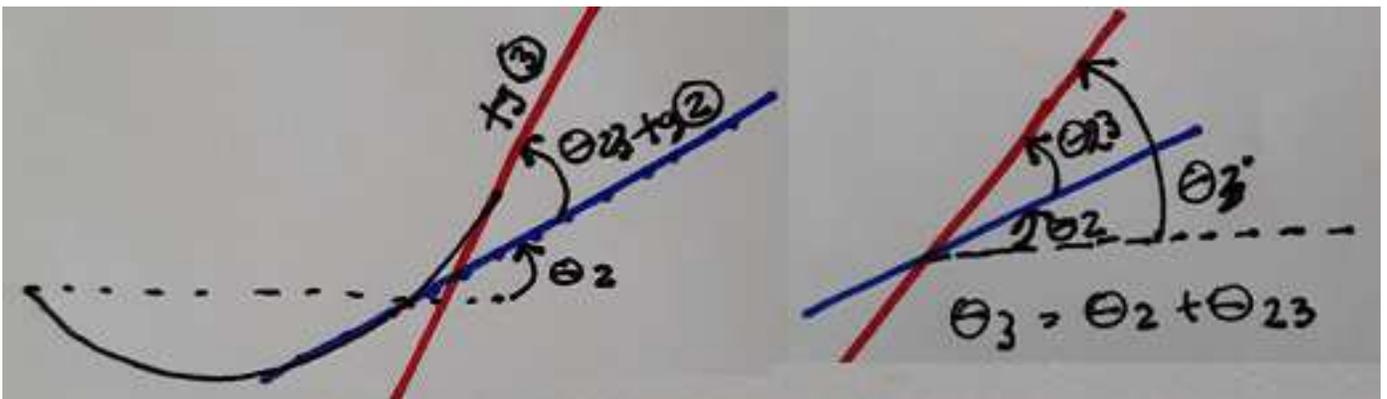
-Para el  $\theta_2$  también se puede aplicar el siguiente procedimiento:

$$\left[ \begin{array}{l} \theta_{12} := \frac{1}{E \cdot I_1} \cdot \int_0^4 MF1(x) \, dx + \frac{1}{E \cdot I_2} \cdot \int_4^6 MF1(x) \, dx \\ \theta_2 := \theta_{12} + \theta_1 \end{array} \right]$$

$$\left[ \begin{array}{l} \theta_{12} := \frac{7439}{5625} \\ \theta_2 := \frac{154648}{253125} \end{array} \right]$$

$$\left[ \begin{array}{l} \theta_{12} := 1.322488888 \\ \theta_2 := 0.6109550617 \end{array} \right]$$

Ángulo en el nudo 3:

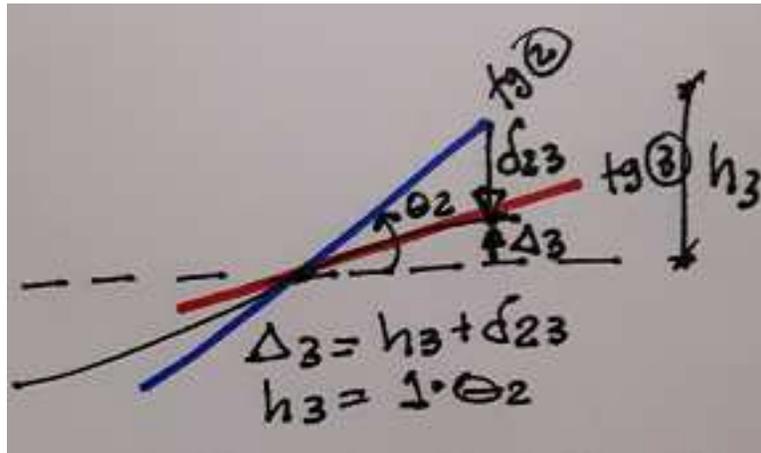


$$\left[ \begin{array}{l} \theta_{23} := \frac{1}{E \cdot I1} \cdot \int_0^7 \text{MF2}(x) \, dx \\ \theta_3 := \theta_2 + \theta_{23} \end{array} \right]$$

$$\left[ \begin{array}{l} \theta_{23} := -\frac{1}{1250} \\ \theta_3 := \frac{308891}{506250} \end{array} \right]$$

$$\left[ \begin{array}{l} \theta_{23} := -0.0008 \\ \theta_3 := 0.6101550617 \end{array} \right]$$

Deflexión en el nudo 3 (volado):

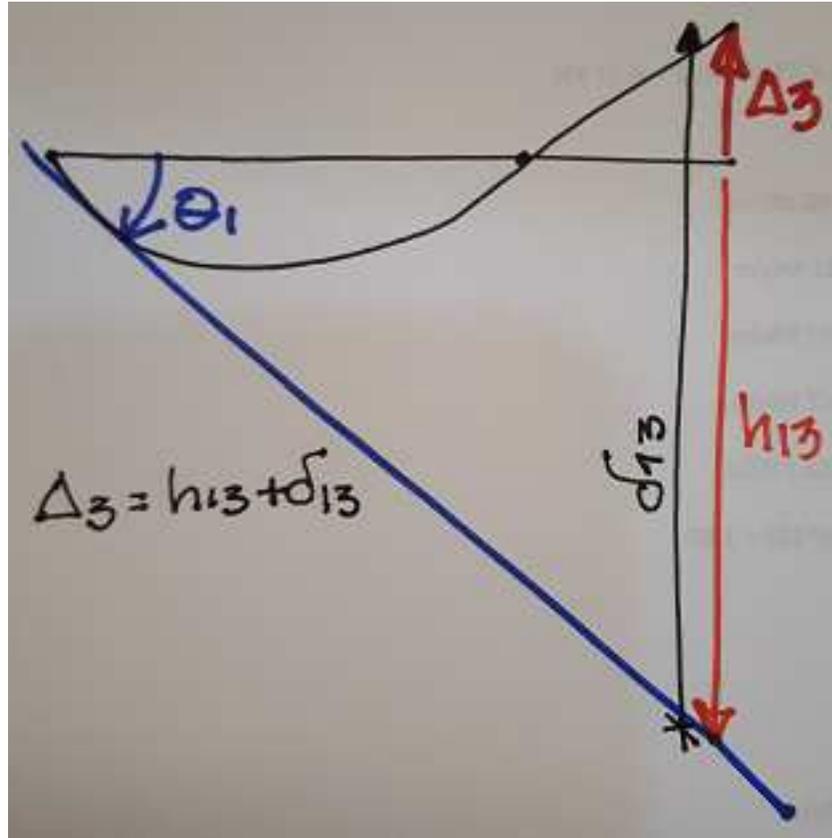


$$\left[ \begin{array}{l} d_{23} := \frac{1}{E \cdot I1} \cdot \int_0^7 \text{MF2}(x) \cdot (7 - x) \, dx \\ h_3 := 1 \cdot \theta_2 \\ \Delta_3 := h_3 + d_{23} \end{array} \right]$$

$$\left[ \begin{array}{l} d_{23} := -\frac{2}{3125} \\ h_3 := \frac{154648}{253125} \\ \Delta_3 := \frac{154486}{253125} \end{array} \right]$$

$$\begin{bmatrix} d_{23} := -0.00064 \\ h_3 := 0.6109550617 \\ \Delta_3 := 0.6103150617 \end{bmatrix}$$

Otra forma de encontrar la deflexión en el nudo 3 es:



$$\begin{bmatrix} d_{13} := \frac{1}{E \cdot I_1} \cdot \int_0^4 MF_1(x) \cdot (7 - x) \, dx + \frac{1}{E \cdot I_2} \cdot \int_4^6 MF_1(x) \cdot (7 - x) \, dx + \frac{1}{E \cdot I_1} \cdot \int_6^7 MF_2(x) \cdot (7 - x) \, dx \\ h_{13} := \theta_1 \cdot 7 \\ \Delta_3 := h_{13} + d_{13} \end{bmatrix}$$

x) dx

$$\begin{bmatrix} d_{13} := 5.591051851 \\ h_{13} := -4.980736790 \\ \Delta_3 := 0.6103150617 \end{bmatrix}$$