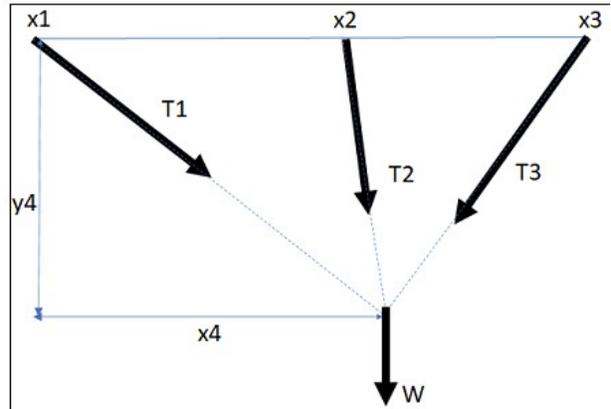


ORIGIN := 1      ii := 1..3

$$XY := \begin{bmatrix} 0 & 0 \\ 3 & 0 \\ 7 & 0 \\ 5 & -3 \end{bmatrix} \quad W := 1000$$

$$\alpha_{ii} := \text{angle}(xv_4 - xv_{ii}, yv_4 - yv_{ii}) - 360 \text{deg} \quad \alpha = \begin{pmatrix} -30.964 \\ -56.31 \\ -123.69 \end{pmatrix} \cdot \text{deg}$$

$$\alpha_3 := |\alpha_3| - 90 \text{deg} \quad \alpha = \begin{pmatrix} -30.964 \\ -56.31 \\ 33.69 \end{pmatrix} \text{deg}$$



$$\alpha_{ii} := \text{angle}(XY_{4,1} - XY_{ii,1}, XY_{4,2} - XY_{ii,2}) - 2 \cdot \pi$$

$$\alpha_3 := |\alpha_3| - \frac{\pi}{2}$$

$$\alpha^T = [-30.964 \quad -56.31 \quad 33.69] \text{deg}$$

Sum of vertical forces:

$$kv_{ii} := \sin(\alpha_{ii})$$

$$T1 \cdot \sin(\alpha_1) + T2 \cdot \sin(\alpha_2) + T3 \cdot \sin(\alpha_3) = W$$

Sum of moments

$$ij := 1..4$$

$$d_{ij} := XY_{ij,1}$$

$$d2 := XY_{2,1}$$

$$d3 := XY_{3,1}$$

$$d4 := XY_{4,1}$$

$$T2 \cdot \sin(\alpha_2) \cdot d2 + T3 \cdot \sin(\alpha_3) \cdot d3 = W \cdot d4$$

$$km_{ii} := kv_{ii} \cdot d_{ii}$$

$$kv^T = [-0.514 \quad -0.832 \quad 0.555]$$

Sum of horizontal forces

$$kh_{ii} := \cos(\alpha_{ii})$$

We're going to solve this via matrix math, not solve blocks (because I'm using Express and solve blocks are "Premium features." The equation gets built like this:

$$M := \text{augment}(kv, km, kh)^T = \begin{bmatrix} -0.514 & -0.832 & 0.555 \\ 0 & -2.496 & 3.883 \\ 0.857 & 0.555 & 0.832 \end{bmatrix}, \quad B := \begin{bmatrix} -W \\ -W \cdot d_4 \\ 0 \end{bmatrix}$$

$$AM := M^T \cdot M$$

$$AB := M^T \cdot B$$

$$T := AM^{-1} \cdot AB = \begin{bmatrix} -1295.767 \\ 2003.084 \\ 0 \end{bmatrix}$$

$$T^T = [-1295.77 \quad 2003.08 \quad 0]$$

Check:  $T \cdot kv + W = 0$

$T \cdot kh = 0$

$T \cdot km + W \cdot d_4 = 0$