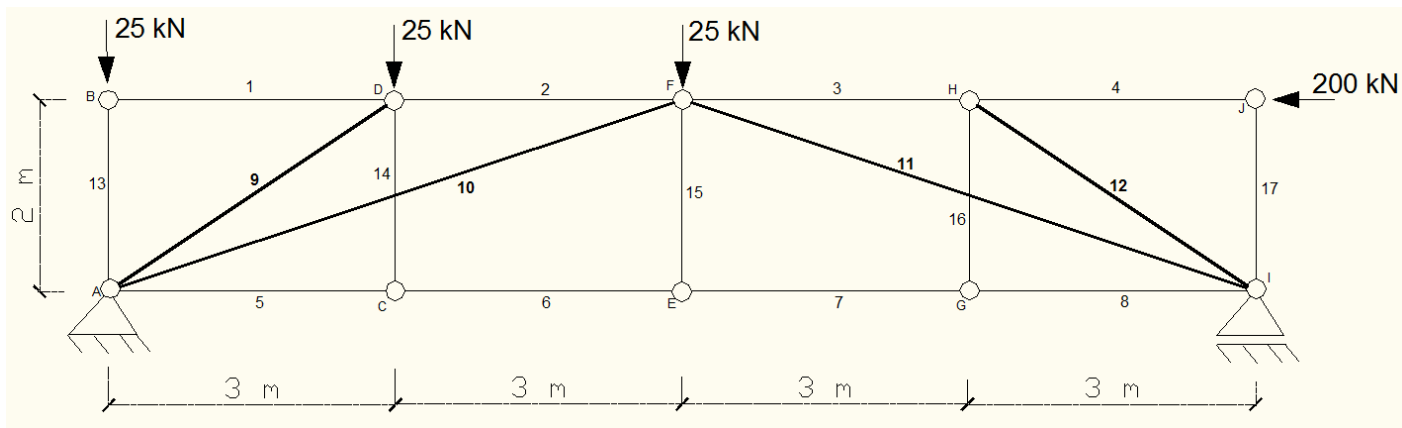


Nº USP: _____ Nome: _____

2ª Questão (3,5 pontos)

Empregando **necessariamente** o processo do equilíbrio dos nós e/ou o processo de Ritter (ou das seções), determinar as forças normais nas barras 9, 10, 11 e 12 da treliça da figura, indicando claramente se essas forças são de tração ou de compressão. No final, escreva essas normais obtidas no espaço indicado.



Respostas:

$N_9 = -45,1 \text{ kN (C)}$

$N_{10} = -125,17 \text{ kN (C)}$

$N_{11} = +46,1 \text{ kN (T)}$

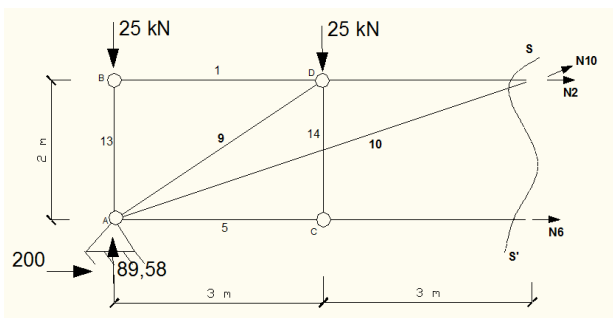
$N_{12} = 0$

Gabarito:

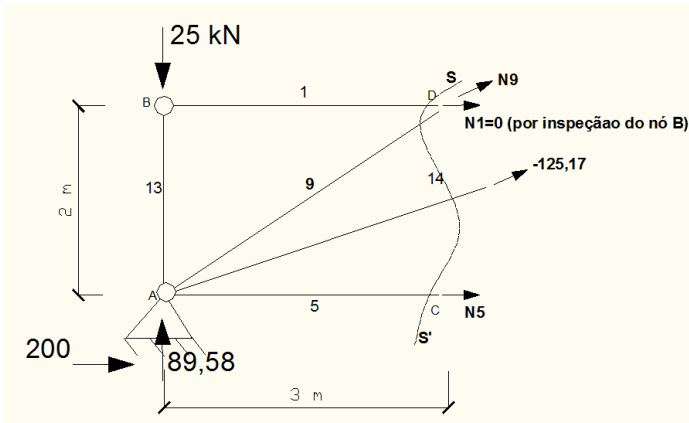
$\sum M_A = 0: 12.R_b + 2 * 200 = 3.25 + 6 * 25 \rightarrow R_b = -14,58 \text{ kN} \downarrow$

$\sum F_y = 0: R_a - 14,58 = 75 \rightarrow R_a = 89,58 \text{ kN} \uparrow$

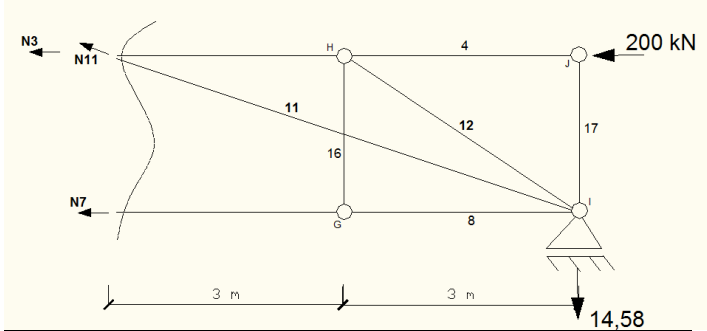
$\sum F_x = 0: R_{Ax} = 200 \text{ kN} \rightarrow$



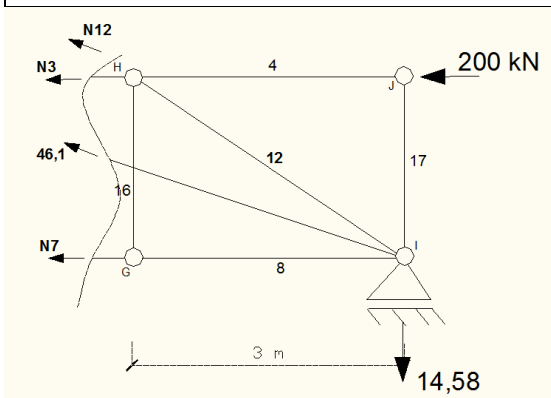
$\sum F_y = 0: N_{10} \cdot \text{sen}\theta + 89,58 = 50 \rightarrow N_{10} = -125,17 \text{ kN (C)}$



$$\sum M_c = 0: N_9 \cdot \cos \alpha \cdot 2 + 89,58 \cdot 3 = 125,17 \cdot \cos \theta \cdot 1 + 25 \cdot 3 \rightarrow N_9 = -45,1 \text{ kN (C)}$$



$$\sum F_y = 0: N_{11} \cdot \sin \theta = 14,58 \rightarrow N_{11} = 46,1 \text{ kN (T)}$$



$$\sum F_y = 0: N_{11} \cdot \sin \theta + N_{12} \cdot \sin \alpha = 14,58 \rightarrow N_{12} = 0$$