Question 3

Find the force acting in each of the members of the truss shown below. Remember to specify if each member is in tension or compression.

Calculations:

Ship reaction forces. Start at point D

\[ \Sigma F_x = \frac{2}{\sqrt{2^2+3^2}} F_{BD} + 600 \sin(30) = 0 \]

\[ \Sigma F_y = -\frac{3}{\sqrt{1^2+3^2}} F_{AD} - F_{CD} - \frac{3}{\sqrt{2^2+3^2}} P_{BD} = 0 \]

\[ \Sigma F_z = \frac{1}{\sqrt{3^2+1^2}} F_{AD} - 600 \cos(30) = 0 \]
\[ F_{BD} = \frac{-600 \sin(30)}{\sqrt{2^2 + 3^2}} = -540.83 \text{ N} \]

\[ F_{AD} = \frac{600 \cos(30)}{\sqrt{2^3 + 3^2}} = 1643.17 \text{ N} \]

\[ F_{CO} = \frac{3}{\sqrt{1^2 + 3^2}} (1643.17) - \frac{3}{\sqrt{2^2 + 3^2}} (-540.83) = -1108.85 \text{ N} \]

\[ \Sigma F_x = -\frac{2}{\sqrt{2^2 + 3^2}} F_{AB} - F_{BC} + \frac{2}{\sqrt{2^2 + 3^2}} (540.83) = 0 \]

\[ \Sigma F_y = R_{BY} - \frac{3}{\sqrt{3^2 + 2^2}} (540.83) = 0 \]

\[ \Sigma F_z = \frac{1}{\sqrt{2^2 + 3^2}} F_{AB} = 0 \]

\[ F_{AB} = 0 \]

\[ F_{BC} = \frac{2}{\sqrt{2^2 + 3^2}} (540.83) = 300 \text{ N} \]

\[ \Sigma F_z = F_{AC} = 0 \]

\[ F_{AC} = 0 \]
Solution:

\[ F_{AB} = 0 \]
\[ F_{AC} = 0 \]
\[ F_{AD} = 1643.17 \text{ N T} \]
\[ F_{BC} = 300 \text{ N T} \]
\[ F_{BD} = 540.83 \text{ N C} \]
\[ F_{CD} = 1108.85 \text{ N C} \]